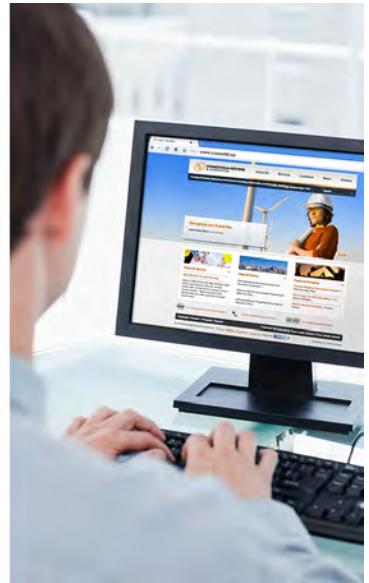




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## 2012 / 2013 ANNUAL REPORT

JIS LANDFILL SITE  
SOUTH BRUNSWICK, NEW JERSEY

Prepared for: JIS PERFORMING PARTIES GROUP

### Conestoga-Rovers & Associates

651 Colby Drive  
Waterloo, Ontario N2V 1C2

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## **Section 1.0    Introduction**

On behalf of the JIS Landfill Site Performing Parties Group (JIS Group), Conestoga-Rovers & Associates (CRA) is submitting this annual progress report for the period October 2012 through September 2013 for the JIS Landfill Site (Site). This is the first time that the JIS Group is submitting an annual report. The reporting period under the approved Remedial Action Work Plan (CRA - September 8, 2010) was semi-annual but changed to annual after 2012. The last report was submitted in November 2012. This annual report includes all sampling and monitoring activities completed since the last report, including those associated with the vapor intrusion assessments as well as all other components that were previously reported independently.

The Remedial Design/Remedial Action activities at the JIS Site were completed pursuant to Administrative Consent Orders (ACO) entered into in 1997 and in 2004 by the JIS Group and the NJDEP. All of the work associated with these ACOs is now complete.

A new Administrative Order (AO) covering future work to be performed at the JIS Site was issued by the USEPA to the JIS Group on September 3, 2010. This AO includes implementation/monitoring of the biosparge system and other remedial components for the Site as described in the Record of Decision (ROD), ROD Amendment, and the approved Remedial Action Work Plan. This annual progress report is being prepared pursuant to Section 13.0 of the Remedial Action Work Plan.

## **Section 2.0    Routine Activities Performed in the Reporting Period**

### **2.1      Biosparge Groundwater Monitoring Program**

The biosparge groundwater monitoring program consists of the collection and analysis of groundwater samples from 45 monitoring wells that were installed along the alignment of the biosparge system. The wells are grouped into 15 well nests with each well nest including a shallow, intermediate, and deep screened interval. The wells in the core of the JIS plume are sampled quarterly, whereas the remainder of the wells in the biosparge monitoring network is sampled annually. The samples from the wells that are on the annual cycle are collected in April of each year to coincide with the annual sampling event for the plume monitoring program. We note that 2013 was the first year in which these wells were sampled on an annual basis. Previously, these wells were sampled semi-annually, but as approved in the Remedial Action Work Plan, the sampling frequency changed to annual after the 2012 sampling event. The biosparge sampling events were conducted on the following dates during this reporting period:

- October 8 – 12, 2012
- January 7 – 8, 2013
- April 3 – 10, 2013

- July 9 – 10, 2013
- October 14 -16, 2013

The wells are sampled for VOCs (including 1,4-dichlorobenzene and 1,2,4-trichlorobenzene), arsenic, and manganese.

A groundwater sample is also collected from well MW-5 as part of the biosparge monitoring program. This well is located immediately downgradient of the landfill and upgradient of the biosparge system, and it provides an indication of the groundwater quality emanating from the landfill.

The biosparge monitoring program focuses on tracking the oxygen and VOC concentrations in the groundwater. The most prominent VOCs are:

- Benzene
- Chlorobenzene
- 1,4-dichlorobenzene
- Xylene
- 1,2,4-trichlorobenzene

Manganese is also a primary compound of concern although it is not a compound that poses a health-related risk. Plots of the chemical concentration trends for these compounds are presented in Figures 1 through 7.

The analytical results from the biosparge monitoring program for this reporting period are presented in Table 1. The 2013 data are consistent with results from previous years and are summarized as follows:

- Groundwater at the JIS Landfill flows easterly. The contaminant plume is limited to a relatively narrow band emanating in the area of MW- 5 and moving downgradient between on-Site wells MW-53 and MP-6 (as shown in Figure 9). The biosparge injection system is located immediately downgradient of MW-53 and MP-6 and it provides treatment of the groundwater prior to reaching the downgradient property boundary. With few exceptions, this system has been successful in treating and mitigating further contaminant migration beyond the eastern property boundary.
- The total VOC concentration from the well located closest to the landfill in the primary core area (MW-5) continues to be elevated with concentrations ranging between 2,100 and 16,000 parts per billion (ppb) in 2013. Monitoring well MP-6 best reflects conditions along the primary plume axis downgradient of MW-5 and upgradient of the treatment zone. Total VOC concentrations at MP-6 exhibit significant reductions when compared spatially to MW-5 and ranged from 400 and 2,700 ppb in 2013. Monitoring well MW-50 is the next downgradient well along the plume axis from MP-6 and

is located within a line of off-property monitoring wells transecting the general plume area approximately 100 feet downgradient from the biosparge injection system. Total VOC levels are significantly reduced along this line and, with the exception of benzene in the shallow zone at well MW-49 and in the intermediate zone at well MW-50; all of the prominent VOCs were below the respective groundwater criterion in this downgradient area during the most recent monitoring event.

- The dissolved oxygen concentrations in the biosparge monitoring wells are presented in Figure 8. The series of 120 injection wells that are used to deliver the compressed air into the aquifer from the compressor / control building is also shown on Figure 8. The oxygen concentrations measured in the most recent 2013 sampling event from the 45 groundwater monitoring wells that make up the biosparge monitoring well network fall into the following categories:

<0.2 ppm	(oxygen deficient)	7 wells
> 0.2 ppm but < 2 ppm	(may be limiting the biodegradation)	1 well
> 2 ppm but < 5 ppm	(adequate to support biodegradation)	4 wells
> 5 ppm	(ideal for biodegradation)	31 wells
– 2 wells have obstructions and could not be sampled		

Of the seven wells where the oxygen level is low, only two (MW-49S and MW-50I) are in the area downgradient of the biosparge system. Given the location of these wells relative to the noted plume axis, we believe that more oxygen is being consumed to support the biodegradation process in the area upgradient of these wells where higher VOC levels, particularly benzene, are present. However, the limited presence of oxygen at MW-49S and MW-50I in conjunction with the saturated oxygen conditions in the vertical zones immediately adjacent to these intervals is expected to facilitate the continued downgradient treatment of groundwater beyond this line of monitoring.

Recommendations for 2014 operations include continued optimization of oxygen distribution to promote increased oxygen levels at MW-49S and MW-50I. CRA has made several adjustments to focus oxygen injection in the core plume area and will continue to monitor and adjust the air injection distribution to further improve oxygen distribution in this area. We note that the JIS Group will be adding a few additional upgradient sentry wells to provide information that should be helpful in managing the operation of the biosparge system. This plan is further described in Section 3.1 and will involve additional groundwater sampling in the biosparge system area.

The JIS Group is also recommending the elimination of arsenic as an analyte in the groundwater monitoring program. In the wells throughout the area, including those cross-gradient from the JIS Site, low level arsenic concentrations have occasionally been observed. However, many of the locations where the concentrations have been detected are sporadic and unrelated to the JIS Landfill. The arsenic, when detected in the biosparge monitoring wells, is at low level concentrations with the highest

concentration detected in 2013 at 24 ppb. Treatment of Site groundwater with oxygen quickly reduces any arsenic concentrations that are Site-related. The arsenic data provides no input to the operation of the biosparge system and therefore the JIS Group recommends that we no longer monitor arsenic concentrations.

## 2.2 Annual Groundwater Monitoring Program

The annual groundwater monitoring program consists of the collection and analysis of groundwater samples from 20 wells in the JIS plume downgradient of the Site. The majority of these wells are within the JIS plume with the remainder being located just outside the plume which helps to delineate the extent of the plume. The tracking of the location of the plume and the concentrations of the chemicals within the plume are the primary purposes of the annual groundwater monitoring program. The annual sampling event is typically conducted in April every year since this is the time of year that it is easiest to access the wells and there is minimal interference with crops. In 2013, the annual sampling event was performed between April 11 and April 18.

The groundwater samples collected for the annual plume program are analyzed for VOCs (including 1,4-dichlorobenzene and 1,2,4-trichlorobenzene), arsenic, and manganese. The analytical results from the 2013 annual sampling program are included in Table 1. The 2013 data are consistent with results from previous years and are summarized as follows:

- As the JIS plume migrates downgradient along its easterly flow path, it also migrates vertically toward the bottom of the aquifer which is on the order of 100 feet below the ground surface. The historical groundwater data have shown that by the time the plume has migrated 2,000 feet downgradient of the Site, what remains of the core of the plume has reached the deep portion of the aquifer, where it continues to attenuate.
- The groundwater quality within the JIS plume area continues to improve.
- The improvement is occurring along the entire length of the plume.
- The mitigation of off-site migration and treatment of the JIS plume that has occurred due to the operation of the biosparge system has bisected the plume with one part remaining beneath the landfill and the other attenuating downgradient plume segment now being separated from the Site by on the order of 1,000 feet. This separation is the treated water zone that has been created by the biosparge system and natural attenuation. The plume continues to move with the groundwater flow regime which is estimated to migrate at a rate of about 1 foot per day. The oxygen enriched groundwater that was created by the biosparge system also continues to move at a rate of about 1 foot per day, thus extending the length of the treatment zone as it continues to migrate. Figure 9 shows the overall extent of the plume as defined by the 2013 annual sampling event. Figures 10, 11, and 12 show the extent of the plume in the individual layers of the aquifer as defined by the shallow, intermediate, and deep portions of the plume.

- The following summarizes the chemical conditions illustrated by the figures:
  - Shallow - There are no off-site exceedances of the NJGWQSs downgradient of the Site beyond the wells located 100 feet from the Site boundary.
  - Intermediate – In the intermediate zone, the plume is limited, extending from well MW-23 to MW-20. The highest benzene concentration is 1.5 ppb (at well MW-23) and the highest total VOC concentration is only 24 ppb (at well MW-20).
  - Deep – In the deep zone, the plume extends from well MW-34 to MW-60. The highest benzene concentration is 15 ppb at MW-60. The easternmost extent of the plume is now located in the vicinity of well MW-60. Historically, Well MW-25 had defined the easternmost extent of the plume but the benzene concentrations at this well have decreased from 2,100 ppb in 2000, to less than 1,000 in 2004, to less than 100 in 2007, and have been below the NJGWQS of 1 ppb for both 2012 and 2013. The benzene concentration at well MW-60 has decreased from 47 ppb in 2007 to 15 ppb in 2013. Expectations are that the concentration of benzene in MW-60 will meet the NJGWQS in the next few years.
  - MW-21 – The groundwater quality patterns at well MW-21 (located in the vicinity of the intersection of Mott Road and South Amboy Turnpike), are not consistent with the patterns and trends noted in the JIS plume. This well is not located along the central axis of the JIS plume and the chemicals present at this well are different from those observed at well MW-25 (which historically defined the eastern limit of the JIS plume). Benzene has never been present in any of the well intervals at MW-21, with the exception of some very low levels (up to 3.2 ppb) that were detected in the intermediate well between the years 2008 and 2009. Consequently, its location and the chemistry indicate that well MW-21 is not located within the limits of the JIS plume. There is only one chemical that has been consistently found in this well nest above its NJGWQS. That chemical is TCE and it has been present at concentrations up to 24 ppb in the intermediate well and up to 45 ppb in the deep well. It has been detected in every sample taken from these two wells since the wells were installed in 1998. It has never been detected in the shallow well. The persistent presence of TCE in the intermediate and deep wells at this location, along with the absence of benzene, is inconsistent with the JIS plume. Furthermore, comparing the rapid decline of benzene in the JIS plume with the limited rate of decline of the TCE concentration at MW-21 suggests that the TCE is not from the same source as the benzene. As discussed in the "Remedial Investigation Addendum – Secondary Plume Area" Report (CRA - July 2009), it is not believed that the source of this TCE is related to the JIS Landfill.

Based on the analytical data collected in recent years, it is recommended that the annual groundwater monitoring program be modified as follows:

1. Similar to the biosparge monitoring program, the JIS Group proposes to eliminate arsenic from the annual groundwater monitoring analyte list. In the wells throughout the area, including those cross-gradient from the JIS Site, low level arsenic concentrations have occasionally been

observed. However, many of the locations where the concentrations have been detected are sporadic and unrelated to the JIS Landfill. The highest arsenic concentration measured in any of the wells included in the annual groundwater monitoring program in 2013 was 8 ppb and that occurred in well MW-56D that is located approximately two miles from the JIS Site and has never had any benzene detected. The JIS Group proposes that in the future, the annual groundwater monitoring program samples will continue to be analyzed for VOCs (including 1,4-dichlorobenzene and 1,2,4-trichlorobenzene) and manganese.

2. Some of the wells included in the annual monitoring program provide minimal information of value to the plume tracking or delineation and should be closed. (This is discussed in Section 3.4). Conversely, there are also some wells that are not included in the annual monitoring program that would provide supplemental information that is of interest; particularly in the determination of the Classification Exception Area (CEA). It is recommended that the annual groundwater monitoring program should be modified to consist of the following wells:
  - MW 7S
  - MW 10I
  - MW 20I & D
  - MW 22I & D
  - MW 23I & D
  - MW 25I & D
  - MW 30I & D
  - MW 32I & D
  - MW 34I & D
  - MW 60D

In addition, samples will be collected from wells MW 21I & D and MW 61D for the next two years to monitor water quality in these areas.

### **2.3 Soil Vapor Intrusion Assessment**

In accordance with the USEPA approved "Vapor Intrusion Sampling Plan" (CRA - August 2011), an annual assessment of the potential for soil vapor intrusion is performed at and around the JIS Landfill. The annual assessment uses the shallow groundwater data from monitoring wells included in the following groundwater monitoring programs to complete the assessment:

- The annual groundwater monitoring program which covers the entire JIS Plume downgradient of the JIS Site

- The groundwater monitoring that is performed to assess the effectiveness of the biosparge injection system
- A supplemental investigation of vapor intrusion potential that was conducted in the vicinity of the southeast corner of the JIS Site.

The data from these shallow wells are compared to the New Jersey Groundwater Screening Levels (NJGWSLs) to determine whether there are any exceedances, and if so, what buildings are in the vicinity of the exceedances that would warrant further consideration for assessment or investigation. The assessment takes into consideration land use changes that occur from time to time that may have a bearing on where specific investigations become necessary.

Based upon the results of the 2012 sampling programs, the 2013 assessment included the following work:

- Sampling of the indoor and outdoor air within and near the JIS building.
- Plans to sample the sub-slab conditions at the residence/auto body shop located at the intersection of Cranbury South River Road and Docks Corner Road. However, access was not granted and therefore it was not possible to collect the planned sub-slab samples from beneath this building.

The results of the 2012/2013 sampling program were submitted to the USEPA and NJDEP in the report entitled "2012/2013 Assessment of Vapor Intrusion Potential" (CRA - October 2013). Comments from the USEPA regarding this report were provided on November 25, 2013 and a letter responding to those comments by the JIS Group was sent to the USEPA on January 10, 2014. The applicable responses have been incorporated into the summarization of the October 2013 annual report that follows. In the future, all of the VI assessment will be incorporated in this annual progress report.

The results of the sampling that was performed later in 2013 are presented in the following sections.

### **2.3.1   Groundwater Sampling**

The groundwater samples collected from the shallow groundwater monitoring wells in 2013 have been compared to the NJGWSLs and are presented in Table 2. Figure 14 presents the 2013 groundwater data on a map of the area. As can be seen from Figures 13 and 14, the 2013 groundwater results are similar to the 2012 results. The only exceedances of NJGWSLs in 2013 occurred on and immediately adjacent to the JIS property. No NJGWSLs were exceeded from any shallow well in the annual monitoring program and only 4 of the 15 shallow wells in the biosparge monitoring program had an exceedance. These are the only areas of potential vapor intrusion concern (see Figure 14).

Based upon these data, the vapor intrusion sampling for the upcoming 2013/2014 heating season will include the following:

- Sampling of the indoor and outdoor air within and near the JIS building (It is planned to include this sampling of the JIS building in each annual event, unless the building is no longer occupied, demolished, or the groundwater quality meets the NJGWSLs).
- Sub-slab and outdoor air samples from beneath and near the residence/auto body shop located at the intersection of Cranbury South River Road and Docks Corner Road. A new request for access will be made to the owner of the property.

These are the only two buildings in the vicinity of a NJGWSL exceedance and therefore the only two buildings included in the planned sampling program for the coming heating season.

In conjunction with the annual plume groundwater monitoring event for 2014 and 2015, the JIS Group proposes to collect groundwater samples from wells MW-66S and MW-67S near the southeast corner of the JIS Site. The inclusion of these two wells in 2014 and 2015 will provide an update of the shallow groundwater quality in the vicinity of the residence/auto body property located at the intersection of Cranbury South River Road and Docks Corner Road.

### **2.3.2 Vadose Zone Well Sampling**

In accordance with the Remedial Action Work Plan, the vadose zone wells that were installed to monitor the soil gas quality around the biosparge injection system continue to be sampled semi-annually. The sampling program involves the use of hand held equipment to monitor the vadose zone in the seven on-Site vadose zone monitoring wells, as shown on Figure 15.

The results of the vadose zone sampling of the biosparge monitoring wells performed in 2013 are presented in Table 3. The results are consistent with the previous years' data. All of the photoionization sample results are 0.0 ppm. Consistent with the Remedial Action Work Plan, no summa canister samples were collected in 2013 since the vapor readings in the wells were at or near background levels.

### **2.4 Site Maintenance**

The routine Site inspections conducted over the past year have not identified any items requiring special attention. All systems are operating / performing normally as follows:

- The air injection system operated as designed. The compressor received normal maintenance.
- The Site cap is in good condition. There were no signs of erosion and the vegetative cover is healthy. The vegetation was cut twice; once in April and again in October.
- The Site security is in good condition.

- There are two biosparge system monitoring wells that have obstructions preventing the insertion of sampling equipment (MW-53S and MW-53 D). Efforts to remove the obstructions were unsuccessful. It is planned to replace these wells in the coming year.

## 2.5 Reporting

The JIS Group submitted the final semi-annual report to the USEPA on November 2, 2012. That report covered the period April through September 2012. In accordance with the approved Remedial Action Work Plan, all future reports, beginning with this one, will be submitted annually. It is planned to submit these annual reports in December each year in conjunction with the JIS Group's preparations for the annual vapor intrusion investigations.

## Section 3.0 Additional Activities Performed in Reporting Period

### 3.1 Nutrient Injection

The groundwater monitoring program that tracks the progress of the groundwater improvement created by the biosparge remediation system has shown that temporal peaks in the concentrations of the influent groundwater occasionally occur. In 2010, a separate groundwater sampling event was performed to evaluate geochemical and biological conditions in the groundwater. The results confirmed that the levels of carbon source and benzene degraders in the groundwater are sufficient for biodegradation. However, the results also confirmed that the levels of nutrients in some wells were at reduced levels and that the availability of nutrients could be a limiting factor in the complete degradation of Chemicals of Concern within the active treatment area; most likely during the episodic periods of peak influent concentrations. Accordingly, a pilot study of nutrient injection was performed in 2011.

In addition to presenting results, the Pilot Study Report (CRA - April 2011) recommended the installation of three upgradient sentry wells and the conversion of two existing wells for the dual purpose of providing valuable groundwater information as well as a potential location for nutrient delivery, if required and approved. In its March 25, 2013 review, the USEPA did not agree with the JIS Group's conclusion concerning the effectiveness of the pilot study and rejected the JIS Group's recommendation to pursue the installation of additional wells for the purpose of nutrient delivery.

Consequently, the JIS Group submitted a letter to the USEPA on August 14, 2013, clarifying its position concerning the installation of the upgradient sentry wells and the conversion of wells PW-1 and PW-2 to monitoring wells. The JIS Group's August 14, 2013 letter acknowledged that the initial purpose for these wells would be to provide information on the quality of the groundwater approaching the biosparge system. Secondary to this monitoring objective, the sentry wells are located so that they can be used to add nutrients to enhance the biodegradation process if it is determined that additional nutrients are

needed and if USEPA approves the injection of supplemental nutrients. The USEPA provided approval on November 25, 2013 to install the additional sentry wells and to convert wells PW-1 and PW-2 into monitoring wells.

### **3.2 Classification Exception Area**

In 2011, the JIS Group submitted a report to the NJDEP providing information on the location of the JIS plume downgradient of the Site and a list of the private properties upon which the plume is located. (The list also included private properties upon which groundwater exceeds a NJGWQS, regardless of the location from which the chemicals may have been sourced.) This documentation was accepted by the NJDEP and on May 6, 2013, the NJDEP issued a letter approving the Classification Exception Area (CEA) as defined in the report. In August 2013, the JIS Group sent registered letters to the property owners, municipalities, and county health departments included in the CEA. The current CEA will remain in effect until 2015. The New Jersey regulations require biennial recertification of the CEA. The first recertification is required to be completed by May 6, 2015. It is noted that the groundwater concentrations in the plume continue to decrease, and therefore, the JIS Group anticipates that the area included in the CEA will also decrease over time. Consequently, the JIS Group also anticipates that the number of properties that will be included in the next iteration of the CEA will also decrease. Figure 16 shows the limits of the CEA based on the most recent 2013 groundwater data.

### **3.3 Freehold Soil Conservation District**

In recent discussions with the Freehold Soil Conservation District, they claimed that the permit initially issued in 2000 for the construction of the Site cap was still open. On September 10, 2013, the JIS Group submitted documentation that is believed necessary to close out this permit.

### **3.4 Well Closures**

There is a number of groundwater monitoring wells that have been installed under the various JIS Site investigations; some of which are no longer required. A program to remove the following wells was included and approved in the Remedial Action Work Plan:

MW 14	MW 36
MW 15	MW 37
MW 24	MW 38
MW 26	MW 39
MW 28	MW 40
MW 35	MW 64

Well MW 15 was closed during this reporting period. It is planned to close the remainder of these wells during the next reporting period. As approved in the Work Plan, each well will be filled with Type 1

cement grout at a ratio of 94 pounds of cement to 5.2 gallons of water (within a density range of 15.0 to 16.3 pounds per gallon). The grout will be pumped under pressure through a tremie tube which will discharge at the bottom of the well. Once the grout has set, the grout elevation will be checked and topped up in accordance with the procedures. The uppermost portion of the well and any protective surface casing will be removed (no concrete cap will be installed). All well work, including the abandonment report, will be performed by a New Jersey licensed well driller.

In addition to the above wells, there are additional wells that should be closed because they are no longer required for the monitoring programs. These wells are as follows:

MW 1	MW 33
MW 9	MW 56
MW 19	MW 62
MW 27	RT 3
MW 29	

The locations of these wells are shown on Figure 17.

In addition, a request was also sent to the USEPA on November 8, 2013 requesting the closure of wells MW-2 and MW-11 to facilitate the neighboring property owner's plans for development. The USEPA responded on November 25 that the wells should not be closed. A plan to convert these two wells into flush mount installations is being discussed with the prospective purchaser of the neighboring property.

### **3.5 Remediation Trust Fund**

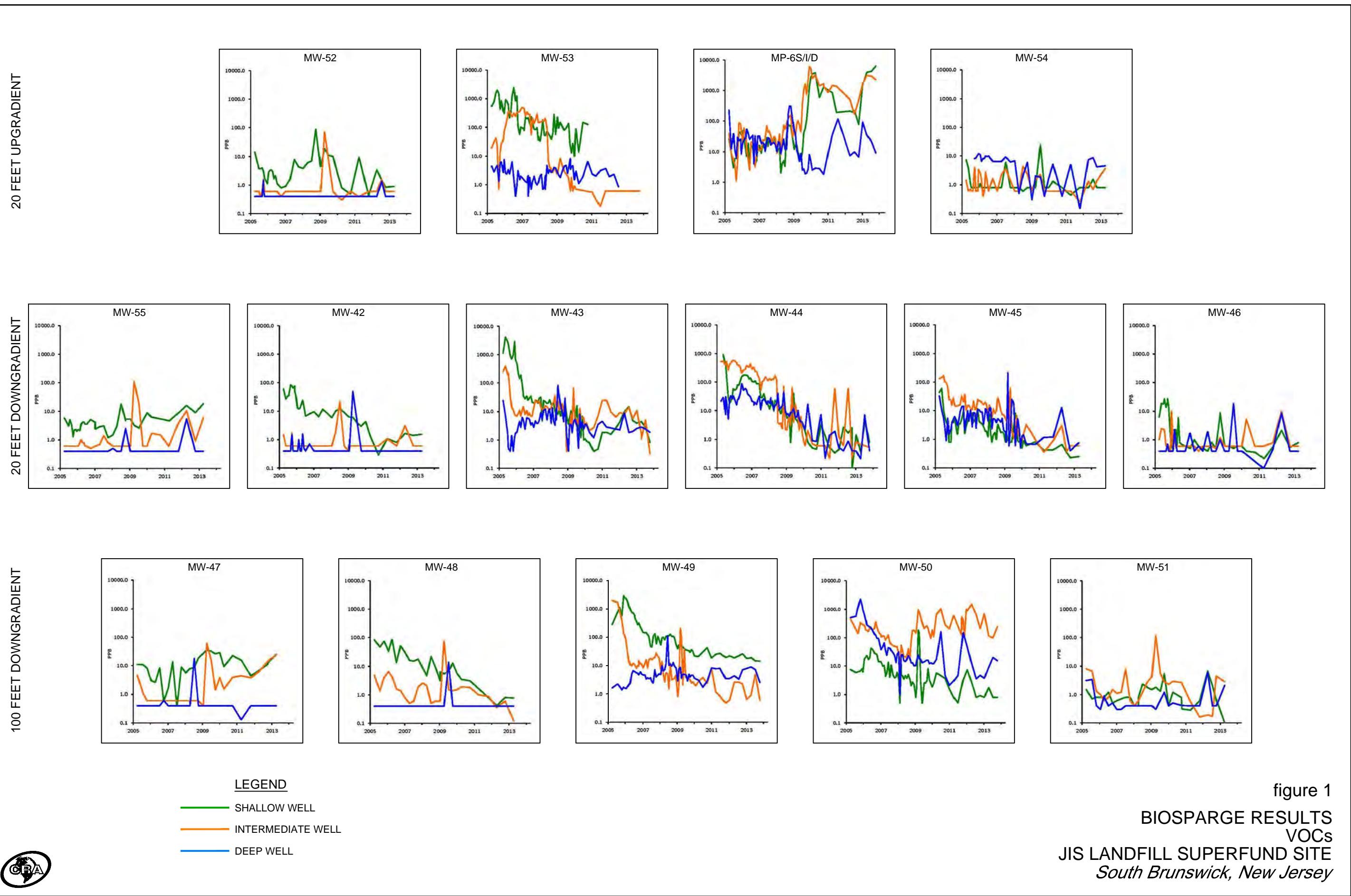
On January 13, 2013, the USEPA approved the termination of the Remediation Trust Fund Agreement.

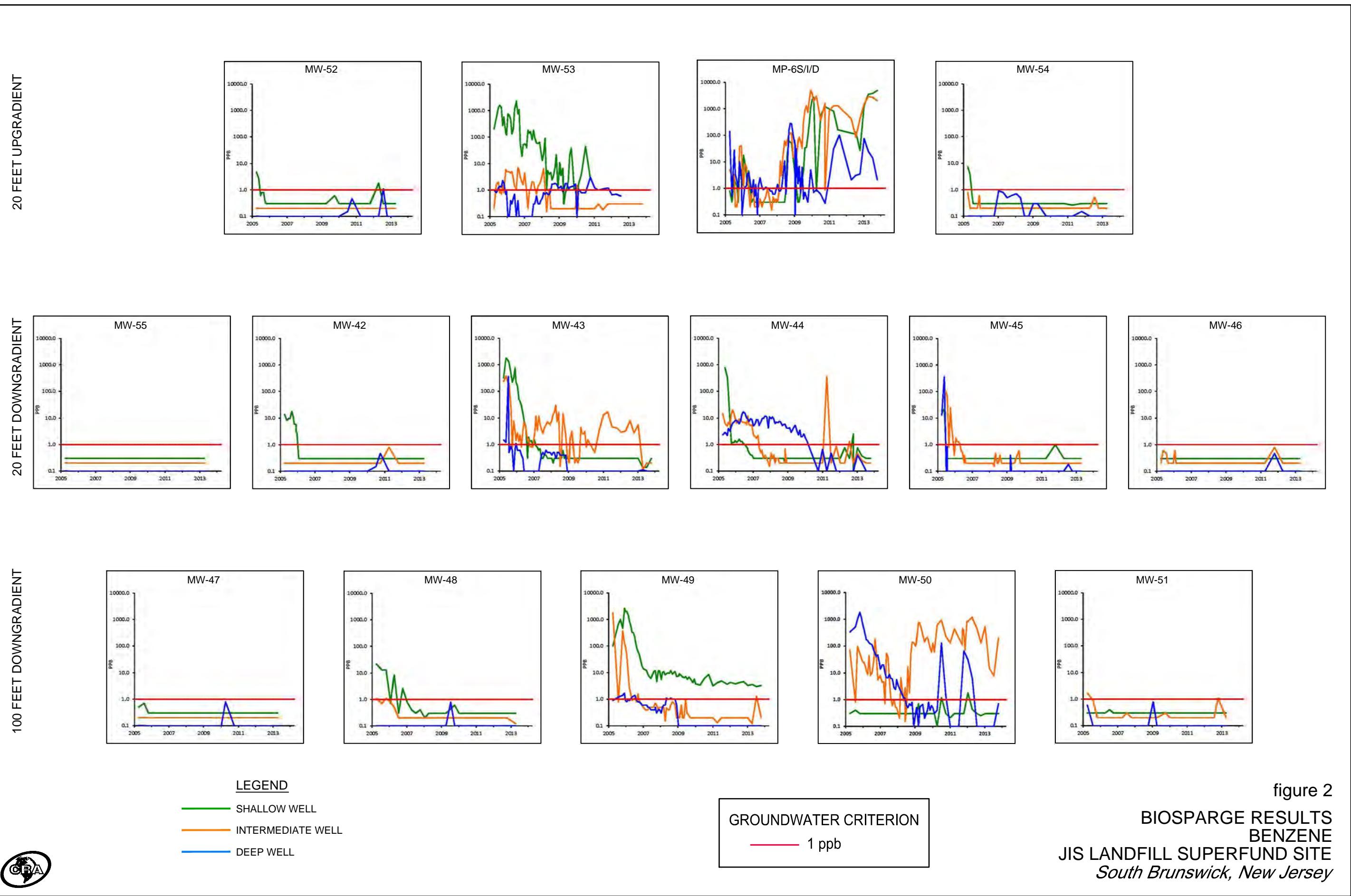
### **Section 4.0 Work Scheduled for the Next Reporting Period**

In the next reporting period, the work to be performed will be compliant with that specified in the Remedial Action Work Plan. The following work is scheduled for the next reporting period:

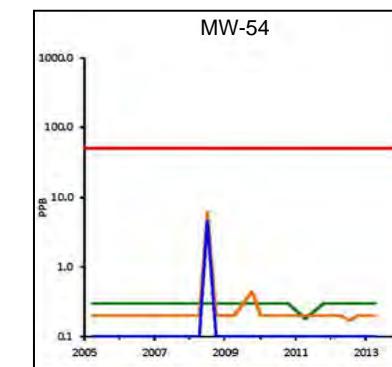
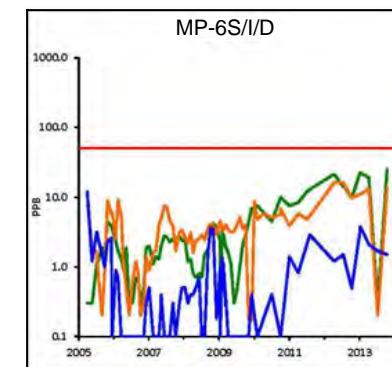
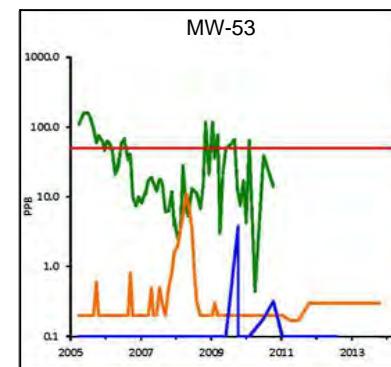
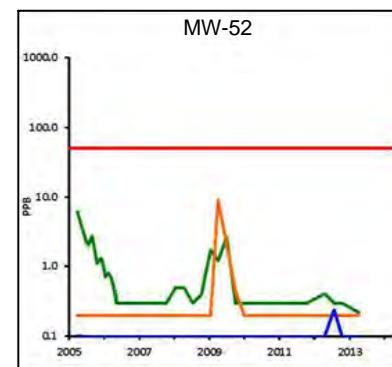
- Continue to operate and maintain the biosparge treatment system.
- Continue to perform the biosparge groundwater monitoring program and the annual plume groundwater monitoring program.
- Perform the soil vapor intrusion sampling during the winter months, including access requests.

- Complete the program of well modifications, replacements, and closures as recommended in this annual report following USEPA approval. If approved, the field work will be completed in the spring or summer of 2014.
- The annual report on the year's activities will be prepared and submitted in December 2014.
- Continue to work with the various property owners around the JIS Site on an as-needed basis.

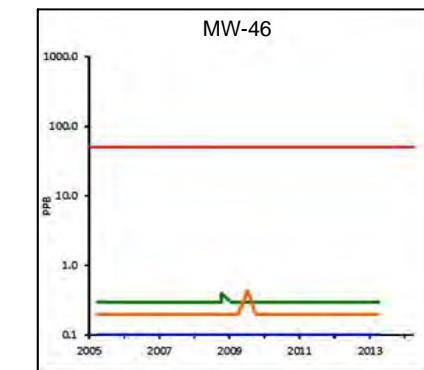
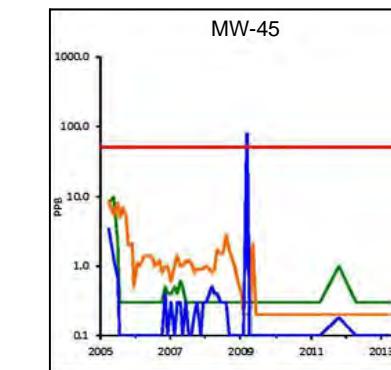
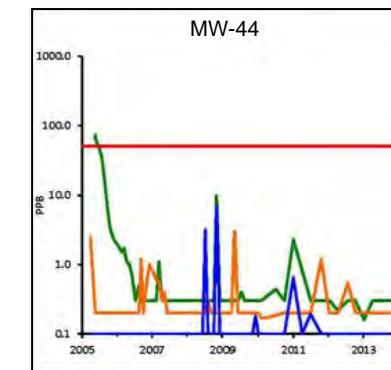
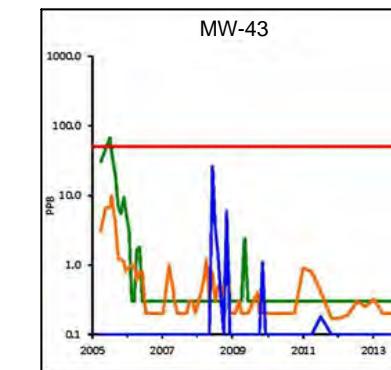
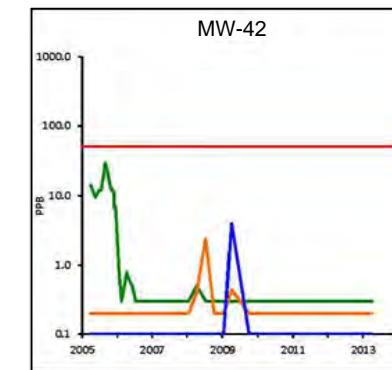
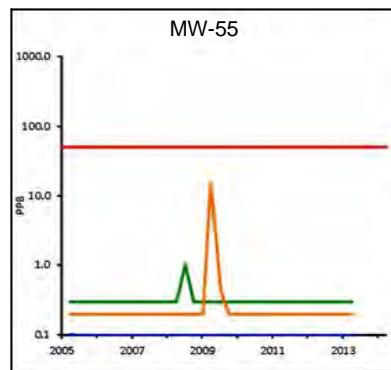




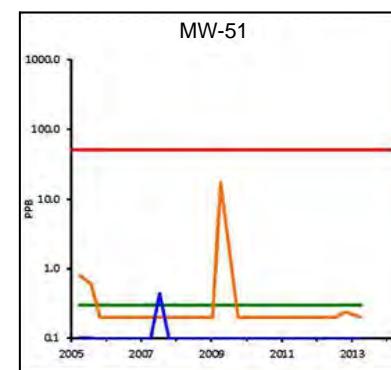
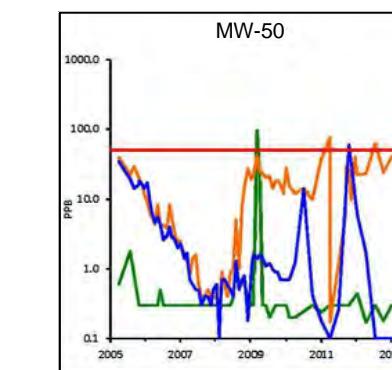
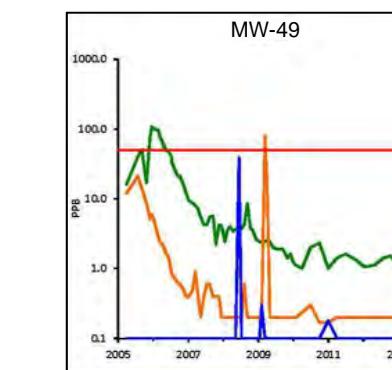
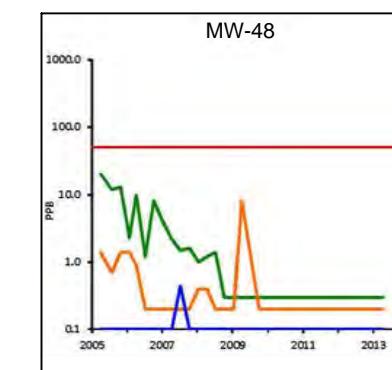
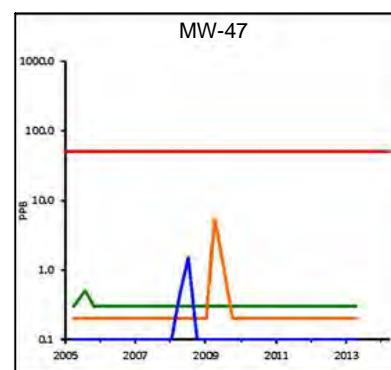
20 FEET UPGRADE



20 FEET DOWNGRADIENT



100 FEET DOWNGRADIENT



LEGEND

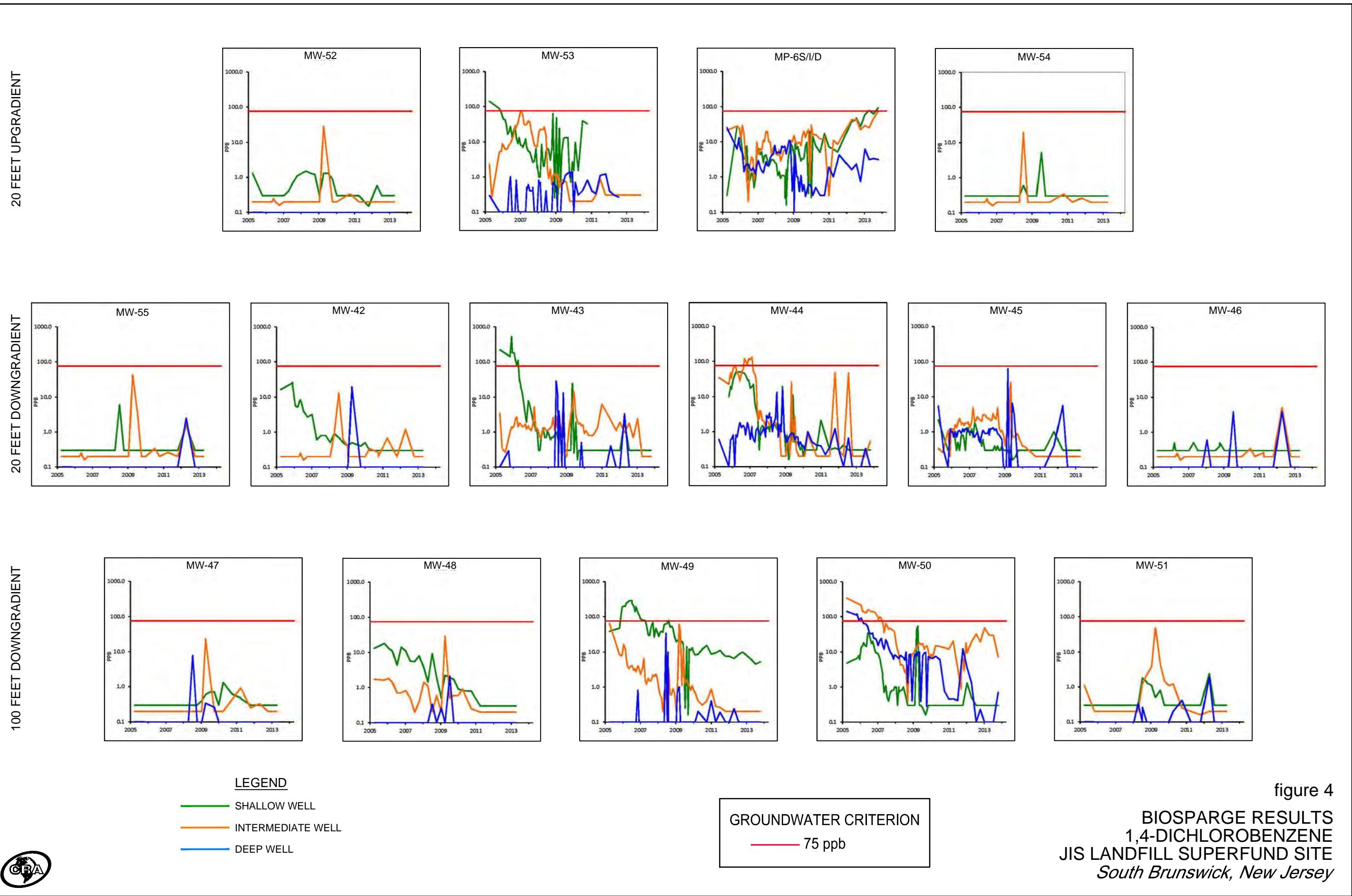
- SHALLOW WELL
- INTERMEDIATE WELL
- DEEP WELL

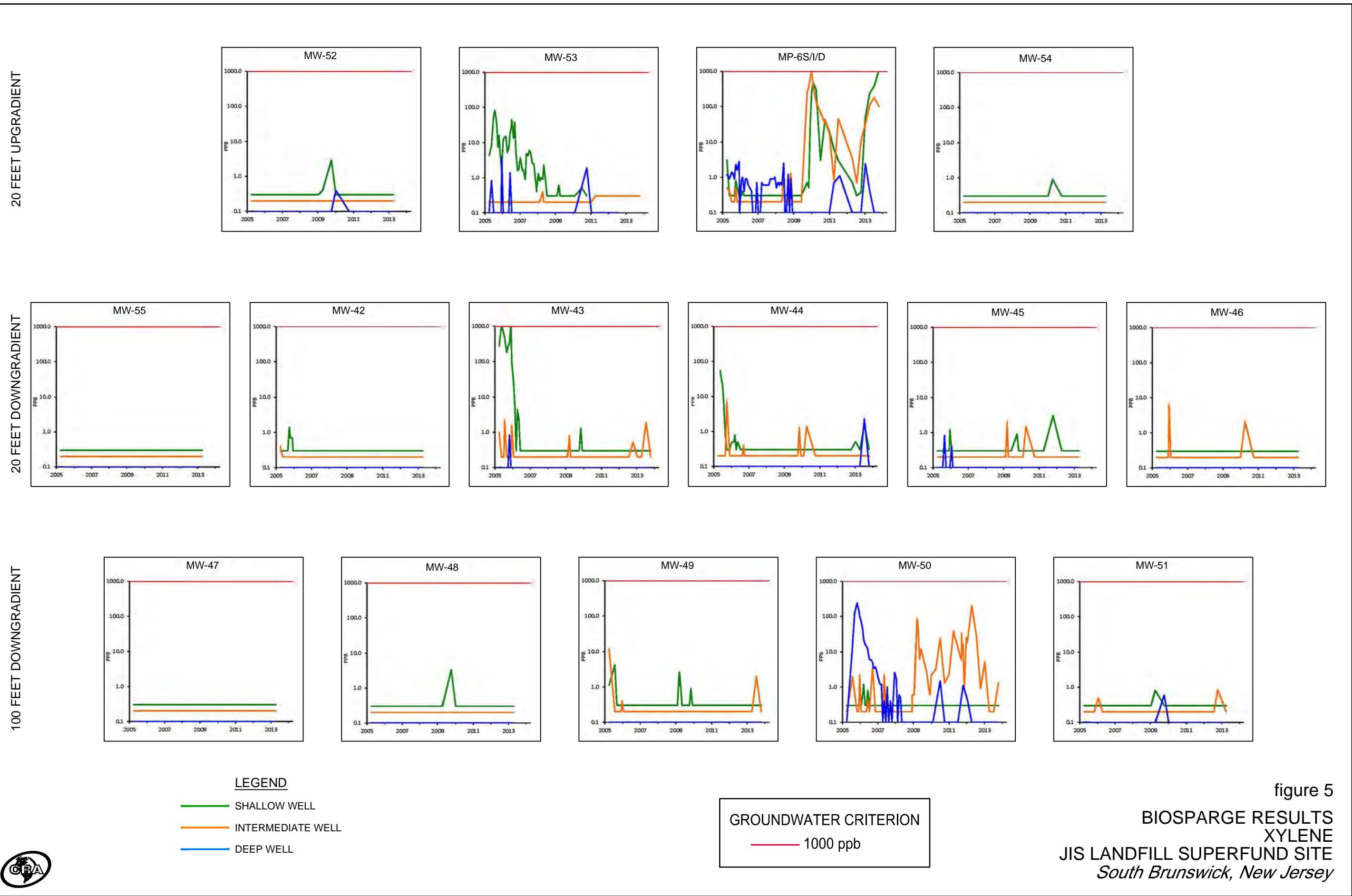
GROUNDWATER CRITERION

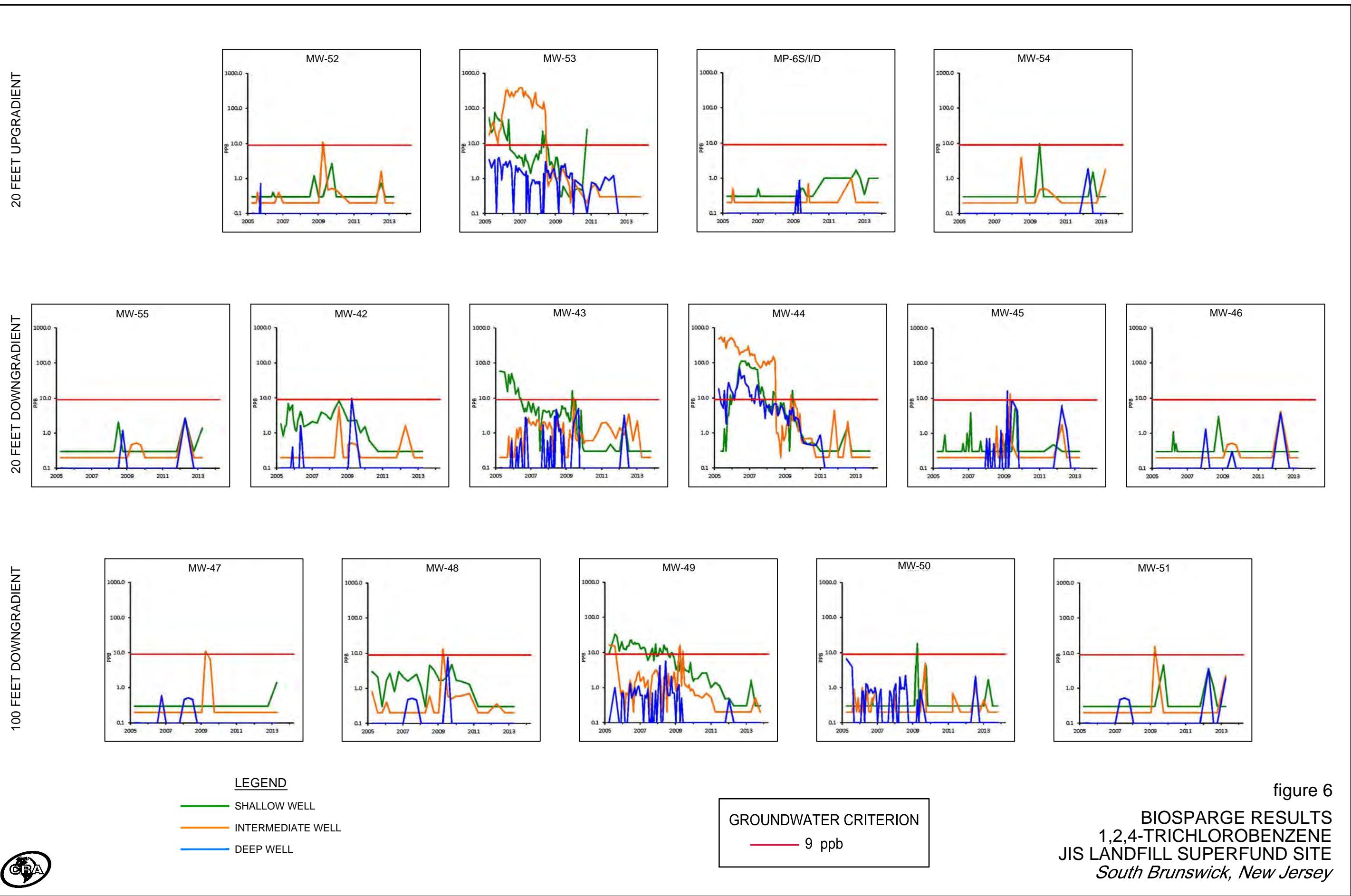
— 50 ppb

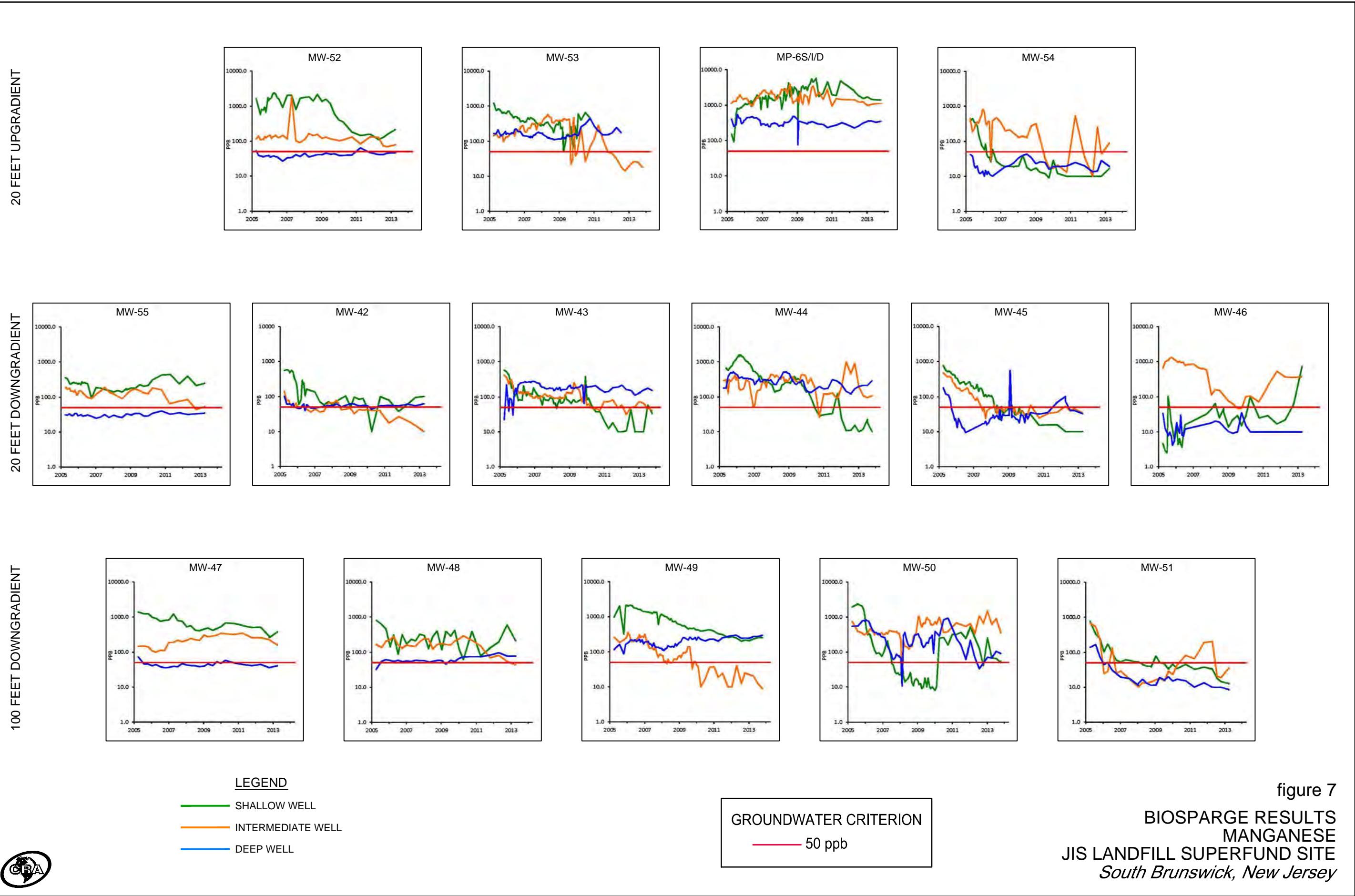


figure 3  
BIOSPARGE RESULTS  
CHLOROBENZENE  
JIS LANDFILL SUPERFUND SITE  
*South Brunswick, New Jersey*









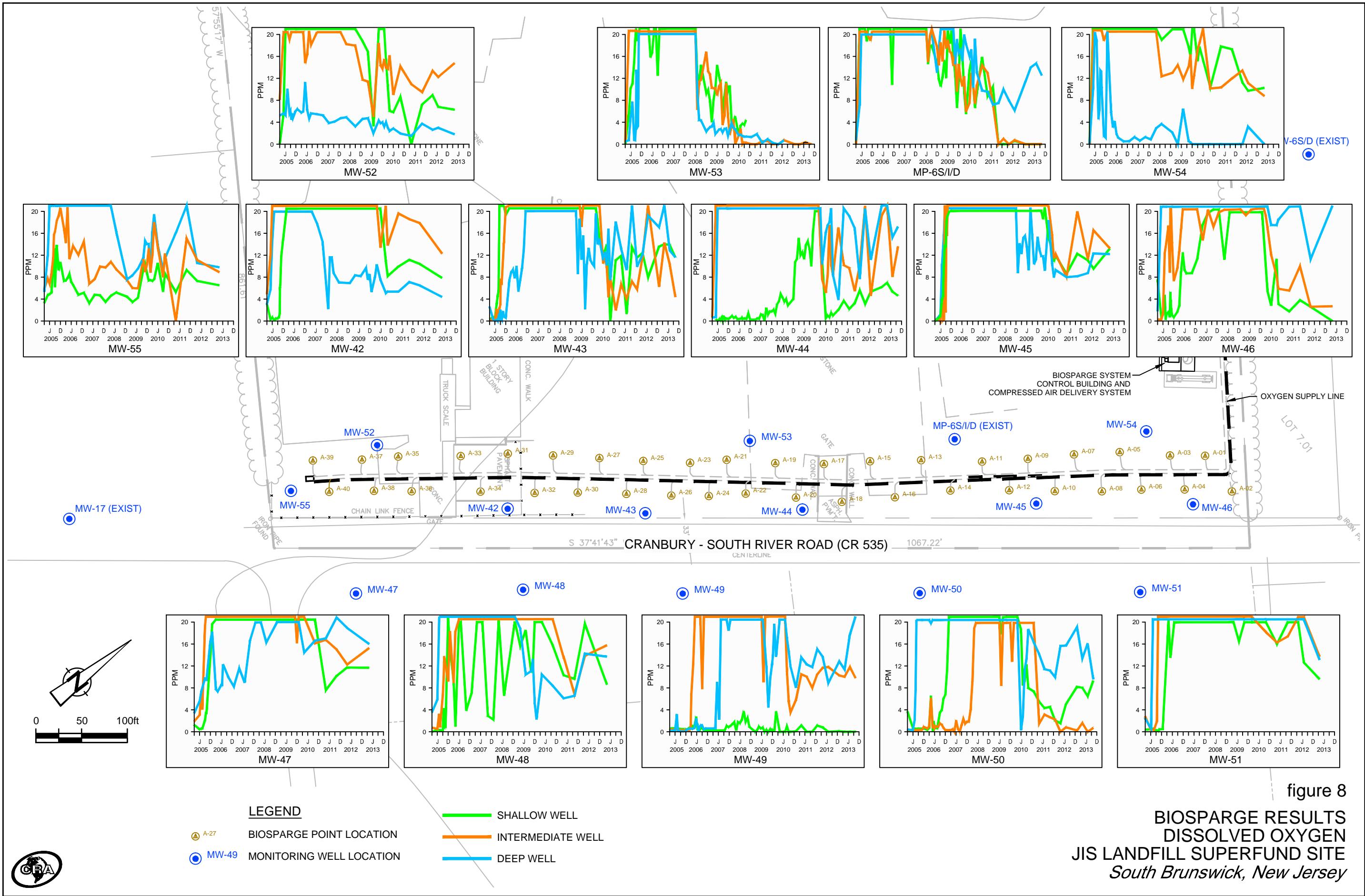
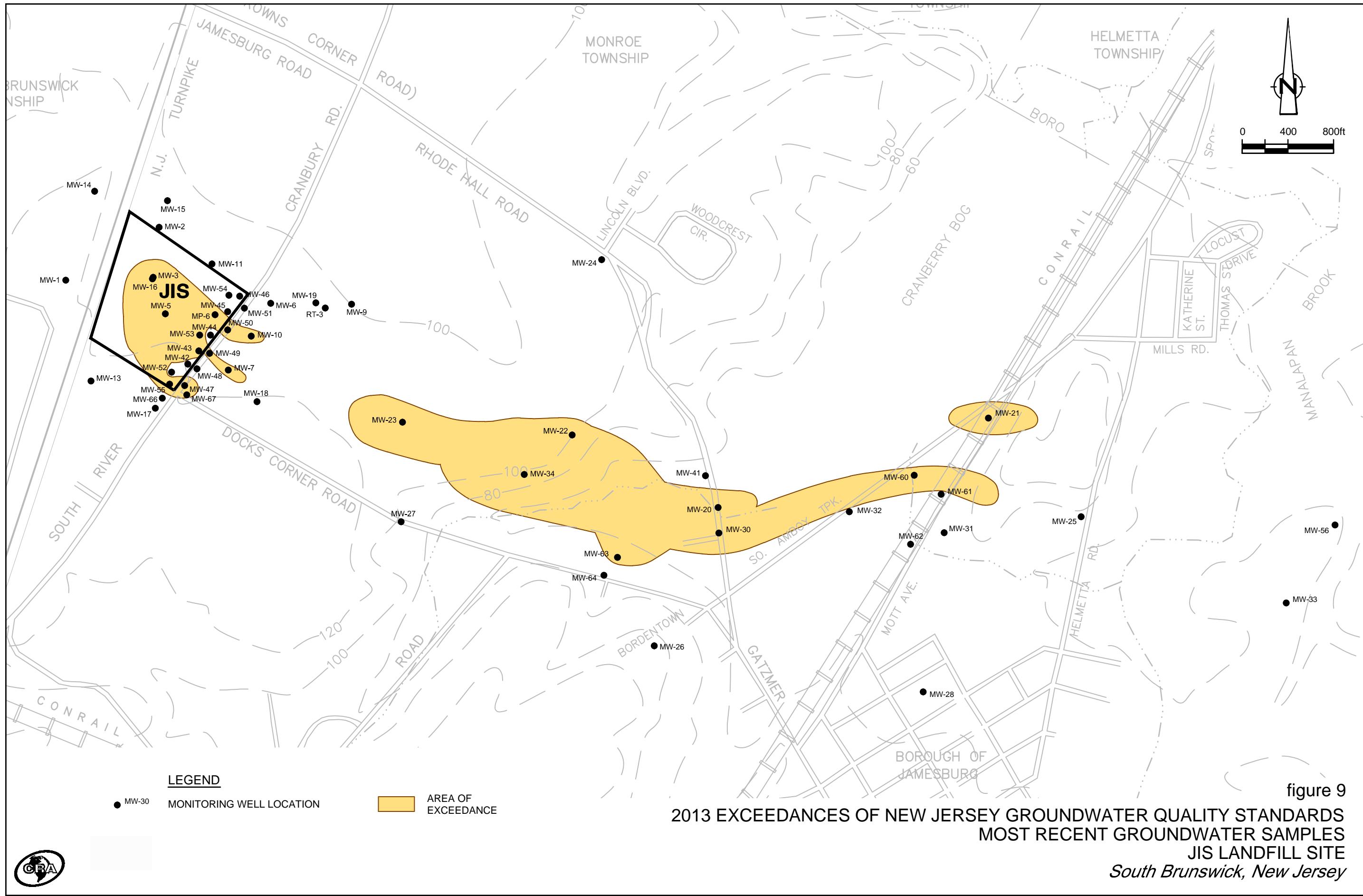
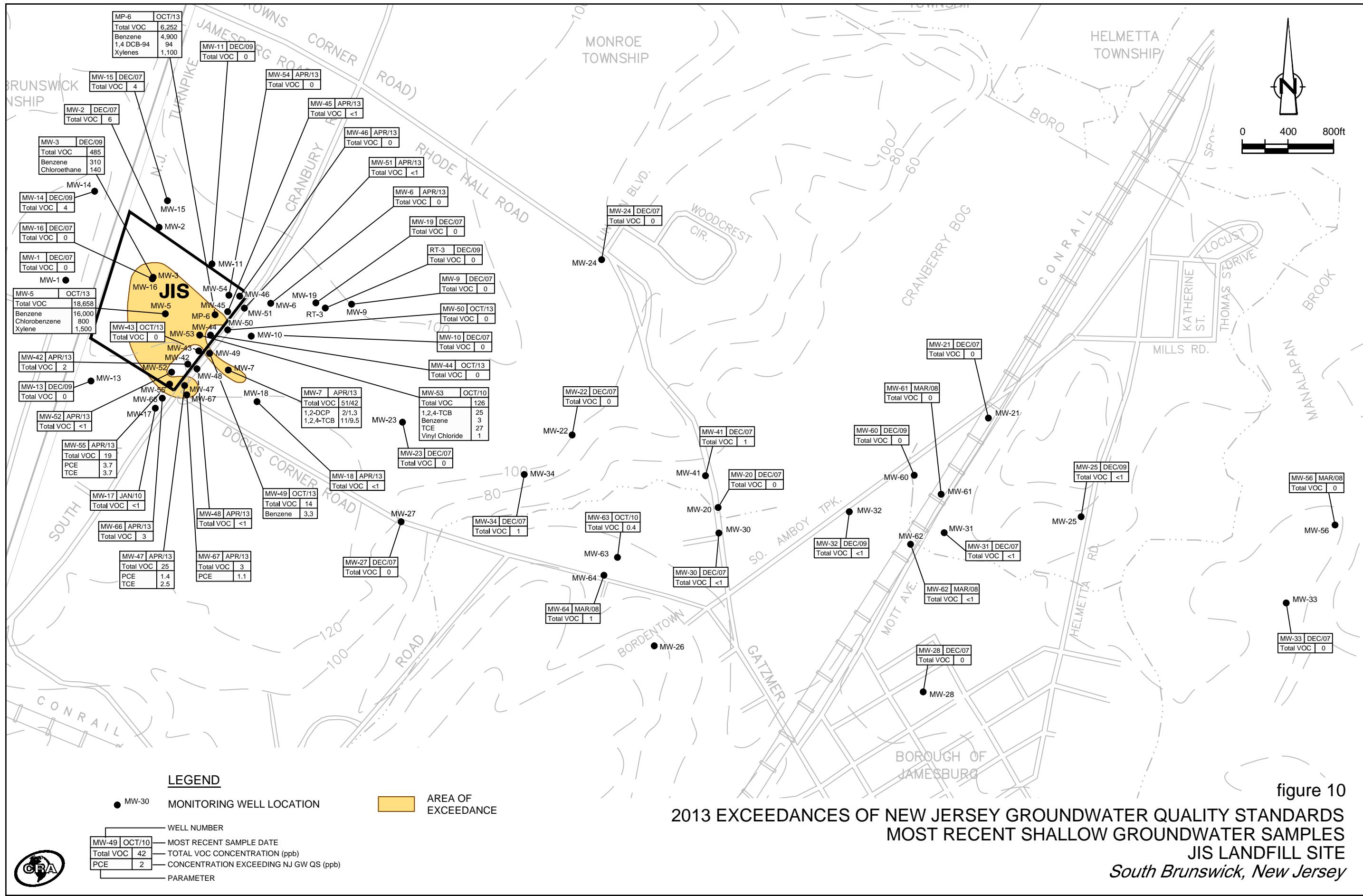


figure 8





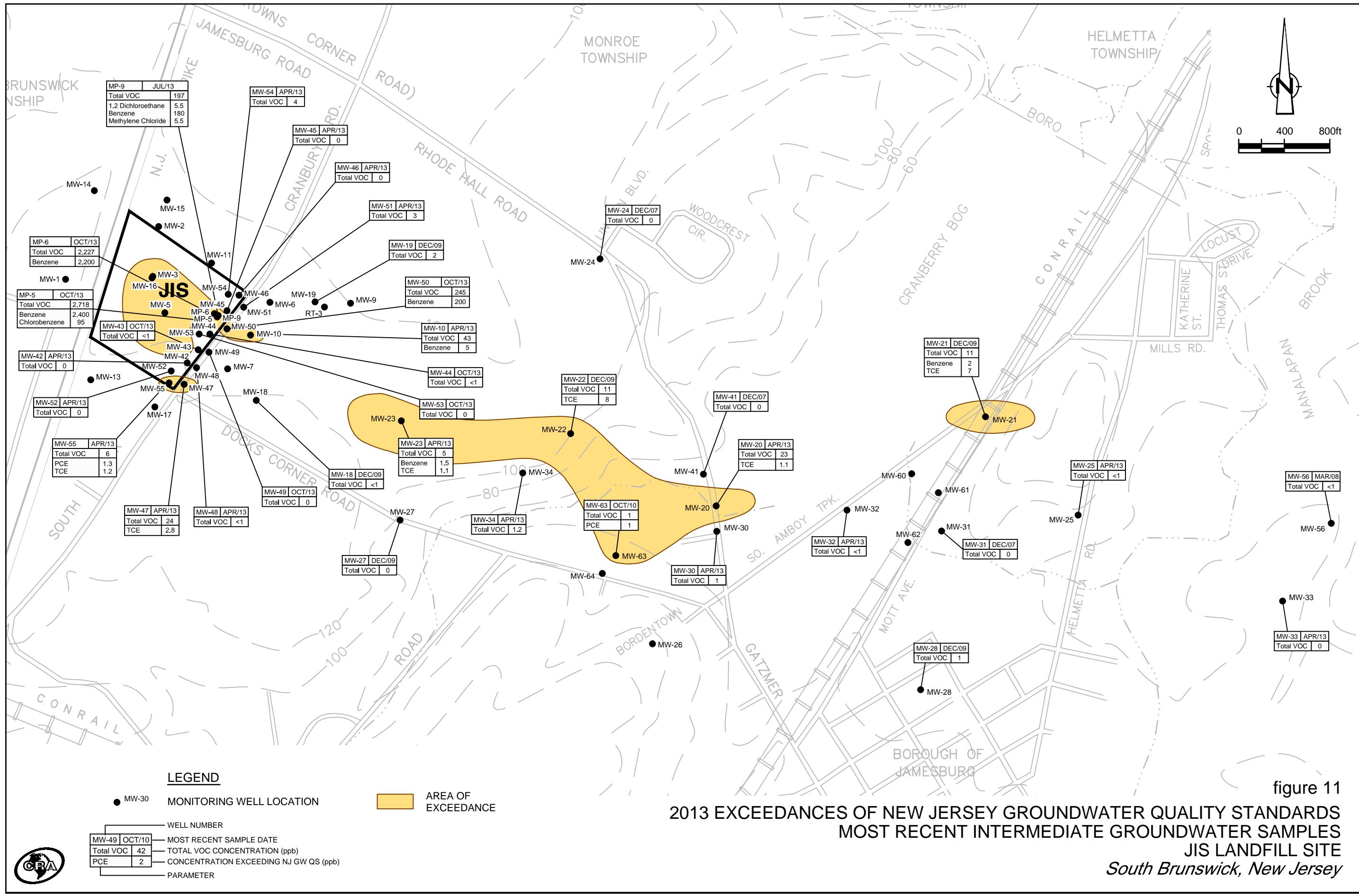


figure 11

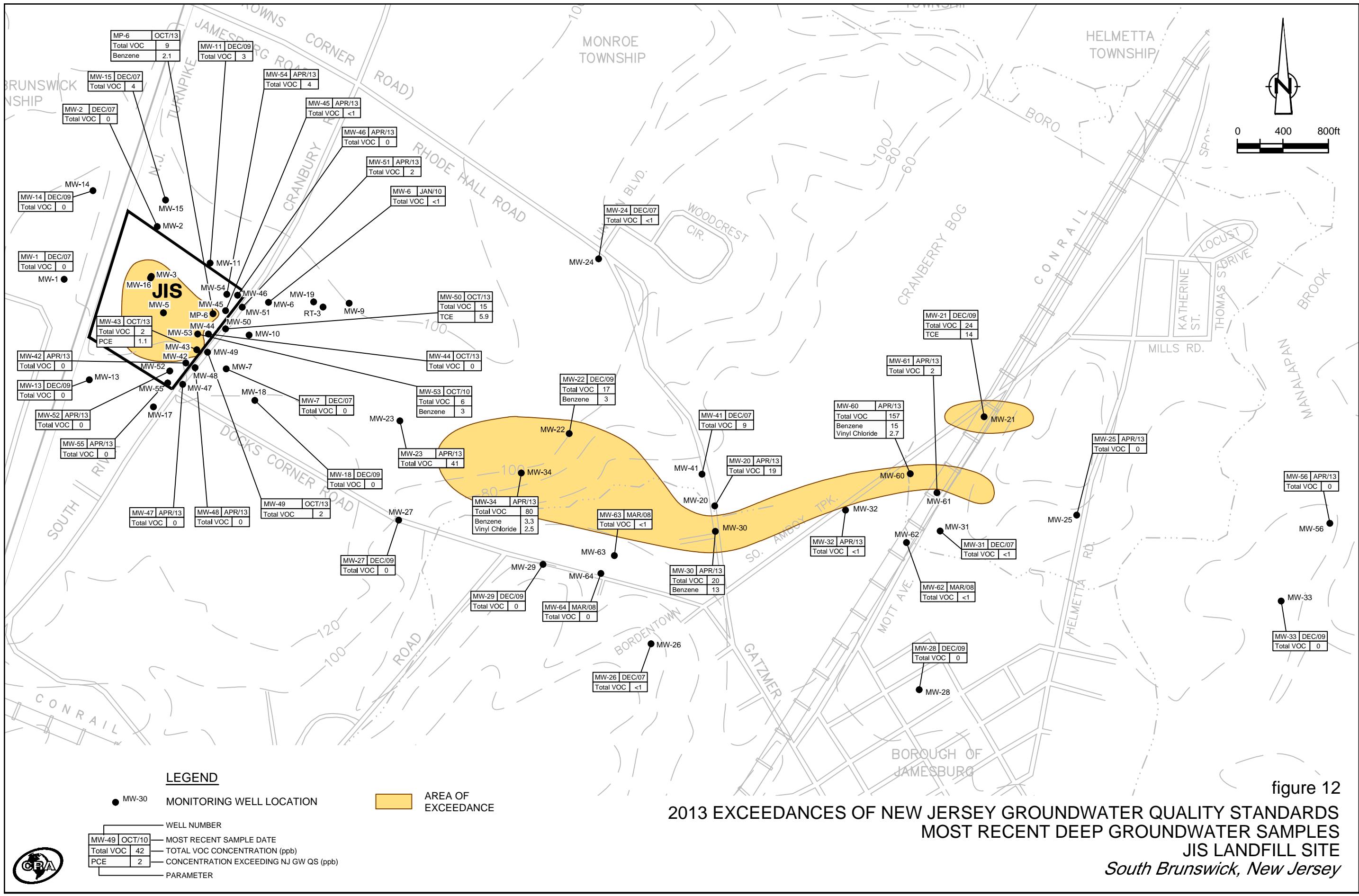


figure 12

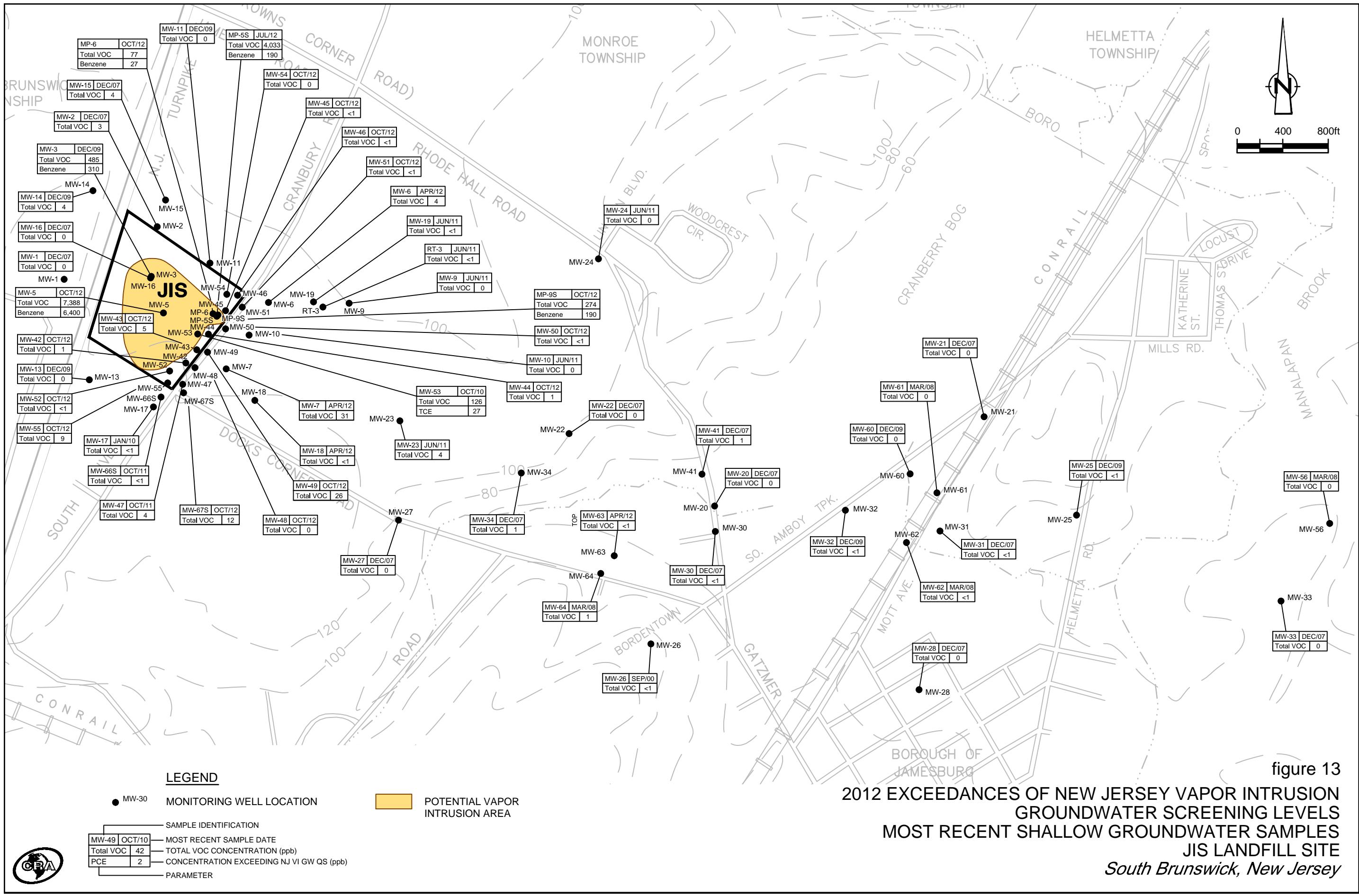


figure 13

2012 EXCEEDANCES OF NEW JERSEY VAPOR INTRUSION  
GROUNDWATER SCREENING LEVELS  
MOST RECENT SHALLOW GROUNDWATER SAMPLES  
JIS LANDFILL SITE  
*South Brunswick, New Jersey*

## *South Brunswick, New Jersey*

14737-00(065)GN-WA015 DEC 12/2013

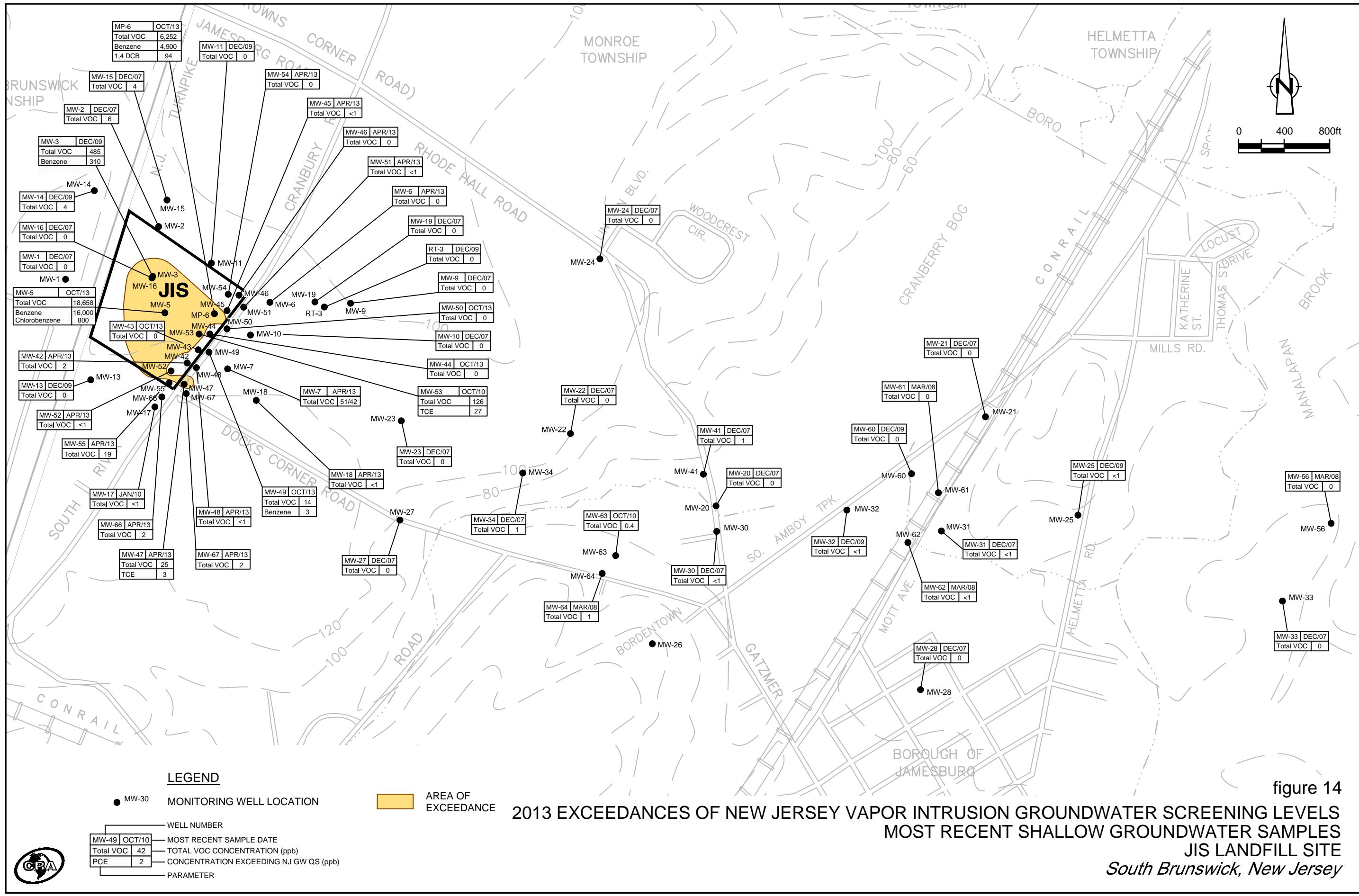
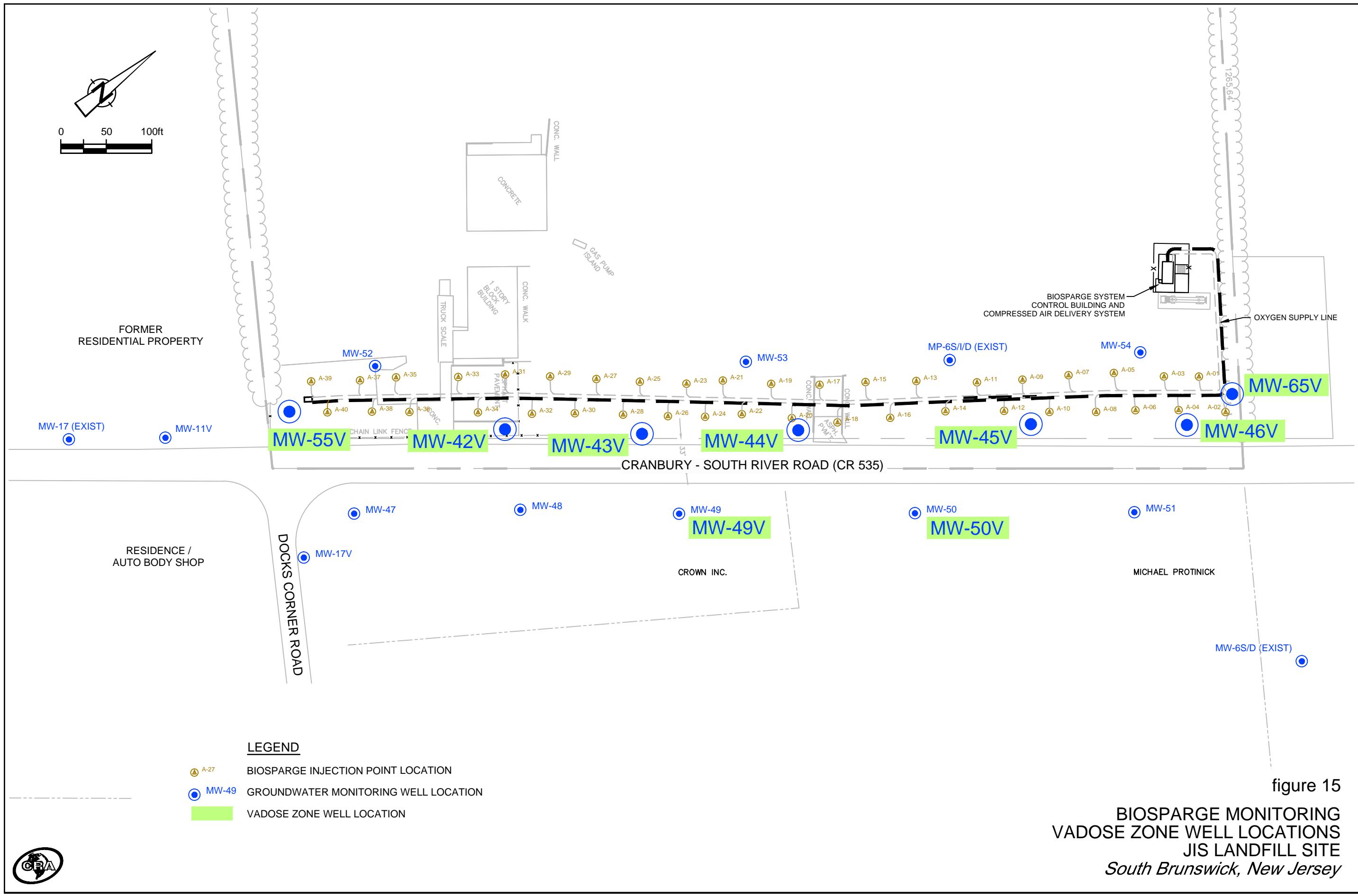
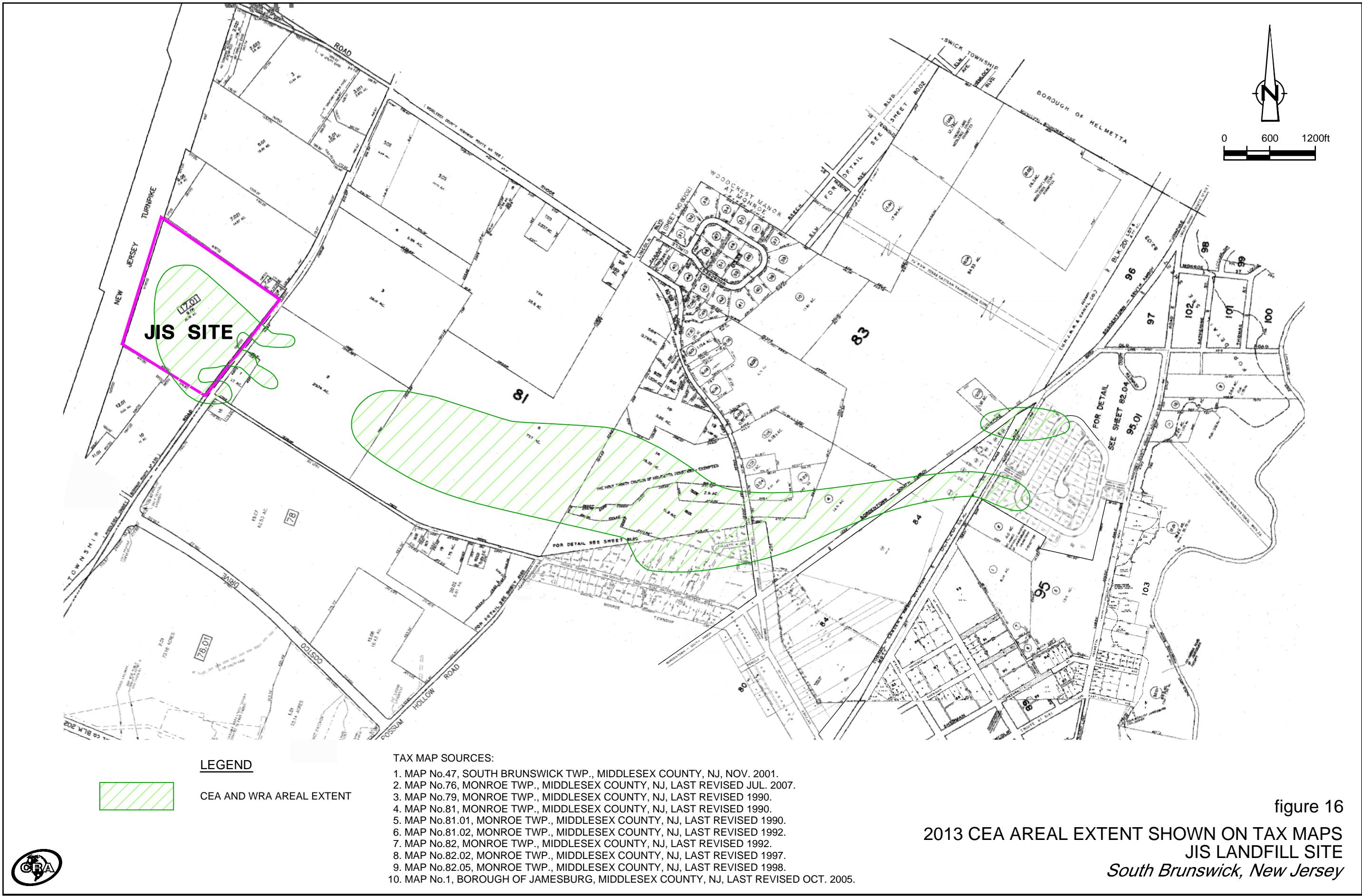


figure 14



**figure 15**

**BIOSPARGE MONITORING  
VADOSE ZONE WELL LOCATIONS  
JIS LANDFILL SITE  
*South Brunswick, New Jersey***



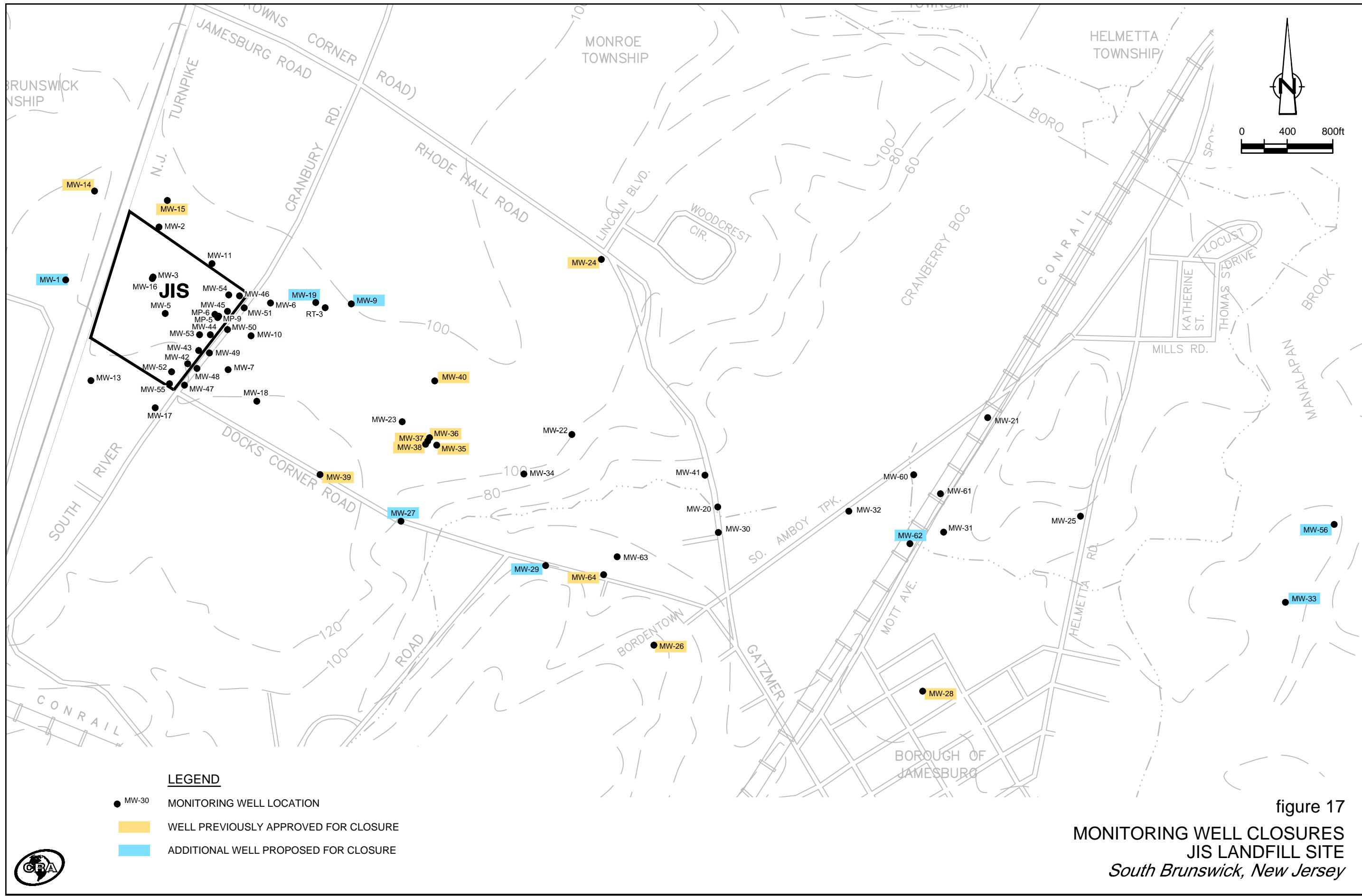


TABLE 1

**GROUNDWATER ANALYTICAL RESULTS  
NJGWQS COMPARISON  
JIS LANDFILL SITE**

Sample Location:	MP-5I	MP-5I	MP-5I	MP-5R	MP-6SR	MP-6SR	MP-6SR	MP-6R	MP-6R	MP-6R	MP-6R	MP-6R	MP-6D	MP-6D	MP-6D	
Sample ID:	14737-101212-43	14737-040813-27	14737-101613-14	14737-101212-40	14737-010713-06	14737-040813-26	14737-070913-19	14737-101513-11	14737-101212-41	14737-010713-07	14737-040813-25	14737-070913-18	14737-101613-15	14737-101212-42	14737-010813-11	
Sample Date:	10/12/2012	4/8/2013	10/16/2013	10/12/2012	1/7/2013	4/8/2013	7/10/2013	10/15/2013	10/12/2012	1/7/2013	4/8/2013	7/10/2013	10/16/2013	10/12/2012	1/8/2013	
Parameter	Units	NUDEP Groundwater Quality Criterion														
<b>Volatiles</b>																
1,1,1-Trichloroethane	µg/L	30	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	
1,1,2-Tetrachloroethane	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	
1,1,2-Trichloroethane	µg/L	3	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	
1,1-Dichloroethane	µg/L	50	5.0 U	0.44 J	5.0 U	0.20 J	1.0 U	0.89 J	200 U	25 U	0.37 J	1.3	0.83 J	150 U	10 U	0.37 J
1,1-Dichloroethene	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	
1,2,4-Trichlorobenzene	µg/L	9	5.0 U	1.0 U	5.0 U	0.34 J	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	
1,2-Dichlorobenzene	µg/L	600	1.2 J	4.3 J	0.83 J	2.0	2.8	200 U	70 J	0.78 J	1.0	0.86 J	150 U	10 U	1.0 U	
1,2-Dichloroethane	µg/L	2	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	0.36 J	
1,2-Dichloropropane	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	
1,3-Dichlorobenzene	µg/L	600	4.5 J	10	35 J	2.4	6.2	10	200 U	12 J	1.9 J	2.9	2.6	150 U	8.5 J	1.0 U
1,4-Dichlorobenzene	µg/L	75	24	53	45 J	27	59	78	62 J	94	22	29	25	47 J	74	0.54 J
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	--	25 U	5.0 U	25 U	5.0 U	5.0 U	1000 U	130 U	10 U	5.0 U	5.0 U	750 U	50 U	5.0 U	5.0 U
Acetone	µg/L	6000	25 U	5.0 U	25 U	5.0 U	5.0 U	1000 U	130 U	10 U	5.0 U	5.0 U	750 U	50 U	5.0 U	5.0 U
Benzene	µg/L	1	1000	2100	2400 J	27	1300	3500	3800	4900	400	1500	2900	2700	2000	3.5
Bromodichloromethane	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Bromoform	µg/L	4	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	µg/L	10	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Carbon tetrachloride	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Chlorobenzene	µg/L	50	21	47	95 J	9.8	22	19	200 U	25	10	11	13	150 U	14	0.49 J
Chloroethane	µg/L	--	7.9	8.9	5.0 U	6.1	10	13	200 U	25 U	4.9	5.3	12	150 U	10 U	0.65 J
Chloroform (Trichloromethane)	µg/L	70	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	0.49 J	0.34 J
Chlormethane (Methyl chloride)	µg/L	--	5.0 U	0.51 J	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	µg/L	70	5.0 U	0.58 J	5.0 U	1.0 U	0.66 J	1.9	200 U	25 U	2.0 U	3.7	3.5	150 U	10 U	0.35 J
cis-1,3-Dichloropropene	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Cyclohexane	µg/L	--	2.9 J	4.1	5.0 U	2.1	6.4	7.7	200 U	16 J	2.7	3.3	6.4	150 U	7.6 J	1.0 U
Dibromochloromethane	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Dichlorodifluoromethane (FCF-12)	µg/L	1000	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Ethylbenzene	µg/L	700	5.1	12	14 J	1.0 U	14	54	200 U	94	2.2	7.4	18	150 U	20	1.0 U
Hexane	µg/L	30	5.0 U	0.38 J	5.0 U	2.3	1.0 U	200 U	25 U	2.0 U	2.2	3.8	150 U	10 U	1.0 U	1.0 U
Methylene chloride	µg/L	3	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Tetrachloroethene	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Toluene	µg/L	600	1.7 J	2.0	4.2 J	0.56 J	3.3	4.4	200 U	4.6 J	1.1 J	1.7	3.0	150 U	2.4 J	1.0 U
trans-1,2-Dichloroethene	µg/L	100	5.0 U	1.1	5.0 U	0.74 J	1.6	1.7	200 U	25 U	0.86 J	1.4	2.3	150 U	10 U	0.30 J
trans-1,3-Dichloropropene	µg/L	1	5.0 U	1.0 U	5.0 U	1.0 U	1.0 U	200 U	25 U	2.0 U	1.0 U	1.0 U	150 U	10 U	1.0 U	1.0 U
Trichloroethene	µg/L	1	5.0 U	1.1	5.0 U	1.0 U	0.22 J	200 U	25 U	2.0 U	0.48 J	1.0 U	150 U	10 U	0.13 J	
Vinyl chloride	µg/L	1	5.0 U	0.36 J	5.0 U	1.0 U	1.0	200 U	25 U	2.0 U	1.0 U	1.2	150 U	10 U	1.0 U	1.0 U
Xylenes (total)	µg/L	1000	14 J	7.4	120 J	0.37 J	48	240	380 J	1100	11	30	110	180 J	100	3.0 U
Total VOCs	µg/L	--	1082.3	2251.19	2717.5	77.48	1475.8	3934.61	4242	6252.6	457.81	1600.68	3102.49	2927	2226.5	6.71
<b>Metals</b>																
Arsenic	µg/L	9.6														

TABLE 1

**GROUNDWATER ANALYTICAL RESULTS  
NJGWQS COMPARISON  
JIS LANDFILL SITE**

Sample Location:	MP-6D	MP-6D	MP-6D	MP-9I	MP-9I	MP-9I	MP-9I	MW-5	MW-10I	MW-18S	MW-20I													
Sample ID:	14737-040813-24	14737-070913-17	14737-101513-10	14737-101212-39	14737-040813-23	14737-070913-13	14737-101613-13	14737-101112-27	14737-010713-04	14737-040813-35	14737-070913-08	14737-101413-01	14737-041013-50	14737-041013-53	14737-041013-54	14737-041013-51	14737-041013-52	14737-041013-51	14737-041013-53	14737-041013-54	14737-041013-51	14737-041013-52	14737-041013-59	
Sample Date:	4/8/2013	7/10/2013	10/15/2013	10/12/2012	4/8/2013	7/10/2013	10/16/2013	10/11/2012	1/7/2013	4/8/2013	7/9/2013	10/14/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	Duplicate		
<b>Parameter</b>																								
<b>Units</b>																								
<b>Volatiles</b>																								
1,1,1-Trichloroethane	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
1,1,2-Tetrachloroethane	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	0.25 J	0.37 J	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,1-Dichloroethane	µg/L	0.77 J	0.51 J	1.0 U	0.25 J	0.37 J	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,1-Dichloroethene	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
1,2,4-Trichlorobenzene	µg/L	1.0 U	13 U	0.65 J	50 U	5.3	41	500 U	19 J	1.0 U	8.6	7.2	0.83 J	1.0 U	1.0 U									
1,2-Dichlorobenzene	µg/L	1.0 U	13 U	0.55 J	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	0.57 J	0.39 J	1.0 U											
1,2-Dichloroethane	µg/L	1.0 U	13 U	0.55 J	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
1,2-Dichloropropane	µg/L	1.0 U	0.21 J	1.0 U	1.0 U	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,3-Dichlorobenzene	µg/L	0.36 J	0.35 J	0.34 J	0.61 J	0.53 J	13 U	2.1	10 J	9.1	5.9	500 U	23 J	1.0 U	3.8	3.1	3.5	1.0 U	1.0 U					
1,4-Dichlorobenzene	µg/L	3.1	3.3	3.1	5.0	3.5	3.2 J	16	50	54	31	500 U	56	1.0 U	14	11	15	1.0 U	1.0 U					
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	63 U	5.0 U	250 U	5.0 U	2500 U	250 U	5.0 U															
Acetone	µg/L	5.0 U	63 U	5.0 U	250 U	5.0 U	2500 U	250 U	5.0 U															
Benzene	µg/L	25	14	2.1	3.7	57	180	240	6400	5000	2100	11000	16000	1.0 U	0.89 J	0.79 J	5.2	1.0 U	0.89 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
Bromoform	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
Bromomethane (Methyl bromide)	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
Carbon tetrachloride	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U					
Chlorobenzene	µg/L	2.1	1.7	1.5	1.6	1.3	2.4 J	4.0	240	240	200	1000	800	1.0 U	8.7	7.1	13	1.0 U	4.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	µg/L	1.0 U	1.2	1.0 U	1.6	1.3	13 U	3.3	26 J	13	5.4	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	µg/L	0.65 J	0.42 J	0.73 J	1.0 U	1.0 U	13 U	1.0 U	50 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Chloromethane (Methyl chloride)	µg/L	1.0 U	13 U	1.0 U	50 U	1.0 U																		

## **BIE 1**

# UNDERWATER ANALYTICAL RESULTS NJGWQS COMPARISON JIS LANDFILL SITE

Sample Location:	MW-20D	MW-23I	MW-23D	MW-25I	MW-25D	MW-30I	MW-30D	MW-32I	MW-32D	MW-33I	MW-34I	MW-34D	MW-42S	MW-42S	MW-42I	MW-42I	MW-42I	MW-42D
Sample ID:	14737-041113-60	14737-041113-64	14737-041113-63	14737-041813-70	14737-041813-71	14737-041113-58	14737-041113-57	14737-041113-65	14737-041113-66	14737-041113-56	14737-041813-67	14737-041813-68	14737-101012-18	14737-040513-16	14737-101012-20	14737-040513-18	14737-040513-19	14737-101012-19
Sample Date:	4/11/2013	4/11/2013	4/11/2013	4/18/2013	4/18/2013	4/11/2013	4/11/2013	4/11/2013	4/11/2013	4/11/2013	4/18/2013	4/18/2013	10/10/2012	4/5/2013	10/10/2012	4/5/2013	4/5/2013	10/10/2012
<b>Parameter</b>																		Units
<b>Volatiles</b>																		
1,1,1-Trichloroethane	µg/L	1.0 U																
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	0.71 J	1.0 U														
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	0.36 J	1.0 U													
1,1-Dichloroethane	µg/L	1.0 U																
1,1-Dichloroethene	µg/L	1.0 U																
1,2,4-Trichlorobenzene	µg/L	2.3	1.0 U	1.7	1.0 U	1.0 U	1.0 U	3.8	1.0 U									
1,2-Dichlorobenzene	µg/L	1.1	1.0 U	0.72 J	1.0 U	1.0 U	0.30 J	1.0 U	1.0 U	1.0 U	1.0 U	3.7	1.0 U					
1,2-Dichloroethane	µg/L	0.47 J	1.0 U	0.42 J	0.44 J	1.0 U												
1,2-Dichloropropane	µg/L	1.0 U	0.77 J	0.82 J	1.0 U													
1,3-Dichlorobenzene	µg/L	1.1	1.0 U	2.6	1.0 U	1.0 U	0.32 J	1.0 U	1.0 U	1.0 U	1.0 U	4.4	1.0 U					
1,4-Dichlorobenzene	µg/L	7.4	0.73 J	31	0.68 J	1.0 U	1.0 U	3.1	1.0 U	1.0 U	1.0 U	38	1.0 U					
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U																
Acetone	µg/L	5.0 U																
Benzene	µg/L	0.88 J	1.5	1.0	1.0 U	3.3	1.0 U											
Bromodichloromethane	µg/L	1.0 U																
Bromoform	µg/L	1.0 U																
Bromomethane (Methyl bromide)	µg/L	1.0 U																
Carbon tetrachloride	µg/L	1.0 U																
Chlorobenzene	µg/L	3.5	0.25 J	5.3	1.0 U	1.0 U	0.62 J	1.0 U	1.0 U	1.0 U	1.0 U	14	1.0 U					
Chloroethane	µg/L	1.0 U																
Chloroform (Trichloromethane)	µg/L	1.0 U	0.26 J	1.0 U														
Chloromethane (Methyl chloride)	µg/L	1.0 U																
cis-1,2-Dichloroethene	µg/L	1.4	0.53 J	0.28 J	1.0 U	1.0 U	0.20 J	1.0 U	1.0 U	1.0 U	1.0 U	4.8	0.22 J	0.29 J	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	µg/L	1.0 U																
Cyclohexane	µg/L	1.0 U																
Dibromochloromethane	µg/L	1.0 U																
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U																
Ethylbenzene	µg/L	1.0 U																
Hexane	µg/L	1.0 U																
Methylene chloride	µg/L	1.0 U																
Tetrachloroethene	µg/L	0.29 J	1.0 U	1.0	0.41 J	0.20 J	0.39 J	1.0 U										
Toluene	µg/L	1.0 U	1.2	3.1	1.0 U													
trans-1,2-Dichloroethene	µg/L	0.54 J	1.0 U	2.1	1.0 U													
trans-1,3-Dichloropropene	µg/L	1.0 U																
Trichloroethene	µg/L	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U	0.23 J	1.0 U									
Vinyl chloride	µg/L	1.0 U	2.5	1.0 U														
Xylenes (total)	µg/L	3.0 U																
Total VOCs	µg/L	18.98	5.08	41.26	0.68	ND	1	19.88	0.2	0.39	ND	1.2	80.4	1.41	1.55	ND	ND	ND
<b>Metals</b>																		
Arsenic	µg/L	2.5 U	2.5 U	6.6	2.5 U													
Manganese	µg/L	247	45.1	492	50.5	101	126	187	95.6	98.1	18.5	41.0	630	94.7	101	15.0	10.0 U	54.3
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>General Chemistry</b>																		
Ammonia	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite (as N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphate (ortho as PO4)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Field Parameters</b>																		
Conductivity, field	µmhos/cm	284	246	1010	314	277	443	321	234	255	160	240	951	1000	999	390	394	276
Dissolved oxygen (DO), field	mg/L	0	0	0	2.91	14.37	1.2	5.52	3.79	0	7.28	0	5.32	7.85	16.04	12.28	1.40	
Ferrous iron	mg/L	3	-	6.1	4	0	0	0	0	2.2	0	2.5	0	0	0	0	0	
Iron	mg/L	13	1.6	6.1	12.8	0.4	4	1	1.1	0.4	2	0.8	17	0.5	0.7	0.6	1	0.8
Oxidation reduction potential (ORP), field	millivolts	117	148	-121	147	194	306	313	414	442	109	317	-70	156	173	235	205	328
pH, field	s.u.	4.95	3.67	6.35	4.02	3.42	4.28	3.71	4.38	4.31	3.4	4.22	6.1	6.34	6.15	5.42	5.61	4.24
Temperature, field	deg C	12.4	13	12.8	13.5	13.3	12.7	12.5	12.1	12.1</								

#### Notes:

> - Greater than amount shown.

J - Estimated concentration.

R - Rejected.

U - Not detected at the associated reporting limit.

**UJ** - Not detected: associated reporting limit is estimated.

- Not applicable.

Not applicable.

TABLE 1

**GROUNDWATER ANALYTICAL RESULTS  
NJGWQS COMPARISON  
JIS LANDFILL SITE**

Sample Location:	MW-42D	MW-43S	MW-43S	MW-43S	MW-43S	MW-43I	MW-43I	MW-43I	MW-43I	MW-43I	MW-43I	MW-43D	MW-43D	MW-43D	MW-43D	MW-44S		
Sample ID:	14737-040513-17	14737-101212-49	14737-010813-15	14737-040913-43	14737-070913-07	14737-101413-05	14737-101112-37	14737-010813-13	14737-040913-41	14737-040913-42	14737-070913-06	14737-101413-04	14737-101112-38	14737-010813-14	14737-040913-40	14737-070913-05	14737-101413-03	14737-101212-47
Sample Date:	4/5/2013	10/12/2012	1/8/2013	4/9/2013	7/9/2013	10/14/2013	10/11/2012	1/8/2013	4/9/2013	4/9/2013	7/9/2013	10/14/2013	10/11/2012	1/8/2013	4/9/2013	7/9/2013	10/14/2013	
<b>Parameter</b>																	Units	
<b>Volatiles</b>																		
1,1,1-Trichloroethane	µg/L	1.0 U																
1,1,2-Tetrachloroethane	µg/L	1.0 U																
1,1,2-Trichloroethane	µg/L	1.0 U																
1,1-Dichloroethane	µg/L	1.0 U	0.34 J	1.0 U	1.0 U	0.13 J	1.0 U											
1,1-Dichloroethene	µg/L	1.0 U																
1,2,4-Trichlorobenzene	µg/L	1.0 U	0.59 J	2.2	1.0 U													
1,2-Dichlorobenzene	µg/L	1.0 U																
1,2-Dichloroethane	µg/L	1.0 U	3.0	3.9	3.2	1.8	1.0 U											
1,2-Dichloropropane	µg/L	1.0 U	1.1	1.0 U	1.1	0.73 J	1.0 U											
1,3-Dichlorobenzene	µg/L	1.0 U	0.26 J	0.74 J	0.56 J	0.45 J	0.32 J	1.0 U										
1,4-Dichlorobenzene	µg/L	1.0 U	0.69 J	2.4	0.23 J	1.0 U												
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U																
Acetone	µg/L	5.0 U																
Benzene	µg/L	1.0 U	1.0 U	1.0 U	0.14 J	0.14 J	1.0 U	2.7	5.5	0.16 J	0.11 J	1.0 U	1.0 U	1.0 U	0.11 J	1.0 U	1.0 U	
Bromodichloromethane	µg/L	1.0 U																
Bromoform	µg/L	1.0 U																
Bromomethane (Methyl bromide)	µg/L	1.0 U																
Carbon tetrachloride	µg/L	1.0 U																
Chlorobenzene	µg/L	1.0 U	0.25 J	0.32 J	1.0 U													
Chloroethane	µg/L	1.0 U																
Chloroform (Trichloromethane)	µg/L	1.0 U																
Chloromethane (Methyl chloride)	µg/L	1.0 U																
cis-1,2-Dichloroethene	µg/L	1.0 U																
cis-1,3-Dichloropropene	µg/L	1.0 U																
Cyclohexane	µg/L	1.0 U																
Dibromochloromethane	µg/L	1.0 U																
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U																
Ethylbenzene	µg/L	1.0 U																
Hexane	µg/L	1.0 U																
Methylene chloride	µg/L	1.0 U																
Tetrachloroethene	µg/L	1.0 U	0.31 J	1.0 U	0.20 J	0.18 J	1.0 U	0.86 J	1.2	1.1	1.2	1.1						
Toluene	µg/L	1.0 U	2.4	1.0 U														
trans-1,2-Dichloroethene	µg/L	0.34 J	1.0 U	1.0 U	1.0 U	1.0 U</												

TABLE 1

## GROUNDWATER ANALYTICAL RESULTS NJGQCS COMPARISON JIS LANDFILL SITE

Sample Location:	MW-44S	MW-44S	MW-44S	MW-44S	MW-44S	MW-44S	MW-44I	MW-44I	MW-44I	MW-44I	MW-44D	MW-45S								
Sample ID:	14737-101212-48	14737-010813-18	14737-040913-37	14737-070913-03	14737-070913-04	14737-101513-08	14737-101112-36	14737-010813-16	14737-040913-38	14737-101513-07	14737-101112-35	14737-010813-17	14737-040913-39	14737-070913-01	14737-101513-06	14737-100812-02	14737-040513-22			
Sample Date:	10/12/2012	1/8/2013	4/9/2013	7/9/2013	7/9/2013	10/15/2013	Duplicate	10/11/2012	1/8/2013	4/9/2013	7/9/2013	10/15/2013	1/8/2013	4/9/2013	7/9/2013	10/15/2013	10/11/2012	1/8/2013	4/9/2013	
<b>Parameter</b>		<b>Units</b>																		
<b>Volatiles</b>																				
1,1,1-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U																
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	1.0 U	1.0 U																
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U																
1,1-Dichloroethane	µg/L	1.0 U	1.0 U	1.0 U																
1,1-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U																
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U																
1,2-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U																
1,2-Dichloroethane	µg/L	1.0 U	1.0 U	1.0 U																
1,2-Dichloropropane	µg/L	1.0 U	1.0 U	1.0 U																
1,3-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U																
1,4-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U																
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U																
Acetone	µg/L	5.0 U	5.0 U	5.0 U																
Benzene	µg/L	0.085 J	0.75 J	0.37 J	1.0 U	1.0 U	1.0 U	1.0 U	0.47 J	0.25 J	1.0 U	1.0 U	0.39 J	0.21 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Bromodichloromethane	µg/L	1.0 U	1.0 U	1.0 U																
Bromoform	µg/L	1.0 U	1.0 U	1.0 U																
Bromomethane (Methyl bromide)	µg/L	1.0 U	1.0 U	1.0 U																
Carbon tetrachloride	µg/L	1.0 U	1.0 U	1.0 U																
Chlorobenzene	µg/L	1.0 U	0.16 J	1.0 U	1.0 U	1.0 U														
Chloroethane	µg/L	1.0 U	1.0 U	1.0 U																
Chloroform (Trichloromethane)	µg/L	1.0 U	1.0 U	1.0 U																
Chloromethane (Methyl chloride)	µg/L	1.0 U	1.0 U	1.0 U																
cis-1,2-Dichloroethene	µg/L	1.0 U	0.23 J	0.34 J	0.28 J	1.0 U	1.0 U	1.0 U												
cis-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U																
Cyclohexane	µg/L	1.0 U	1.0 U	1.0 U																
Dibromochloromethane	µg/L	1.0 U	1.0 U	1.0 U																
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U	1.0 U	1.0 U																
Ethylbenzene	µg/L	1.0 U	0.31 J	1.0 U	1.0 U	1.0 U														
Hexane	µg/L	1.0 U	1.0 U	1.0 U																
Methylene chloride	µg/L	1.0 U	1.0 U	1.0 U																
Tetrachloroethene	µg/L	1.0 U	1.0 U	1.0 U																
Toluene	µg/L	1.0 U	1.0 U	1.0 U																
trans-1,2-Dichloroethene	µg/L	1.0 U	2.0	1.0 U	1.0 U	1.0 U														
trans-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U																
Trichloroethene	µg/L	1.0 U	1.0 U	1.0 U																
Vinyl chloride	µg/L	1.0 U	1.0 U	1.0 U																
Xylenes (total)	µg/L	3.0 U	0.51 J	3.0 U	3.0 U	1.5 J	1.6 J	2.0 U	3.0 U	3.0 U	2.0 U	3.0 U	3.0 U	2.0 U	3.0 U	3.0 U	2.0 U	3.0 U	3.0 U	
Total VOCs	µg/L	0.085	1.42	0.37	3.5	4.43	ND	0.23	0.81	0.67	ND	0.53	ND	0.39	0.21	7.01	ND	0.23	0.25	
<b>Metals</b>																				
Arsenic	µg/L	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U	2.5 U	2.5	2.5 U	2.5 UJ	2.5 U	2.5 U	2.5 U							
Manganese	µg/L	15.4	10.0 U	11.9	22.7	18.1	10.0 U	901	190	107	95.3	109	167	197	211	209	286	10.0 U	10.0 U	
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>General Chemistry</b>																				
Ammonia	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chloride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nitrate (as N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nitrite (as N)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Orthophosphate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphate (ortho as PO4)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Field Parameters</b>																				
Conductivity, field	µmhos/cm	1430	1400	1250	925	-	1240	835	810	566	641	968	306	439	516	685	902	1040	1210	
Dissolved oxygen (DO), field	mg/L	3.04	6.19	6.97	5.36	-	4.61	369.00	19.27	20>	8.05	13.58	20>	20>	20>	15.23	17.19	10.50	13.17	
Ferrous iron	mg/L	0.0	0.0	0	-	-	0.0	0.0	0.1	0	-	0.0	0.0	0.2	0	-	0.0	0.0	0	
Iron	mg/L	1.4	0.8</																	

### Notes:

> - Greater than amount shown.

J - Estimated concentration.

R - Rejected.

U - Not detected at the associated reporting limit.

UJ - Not detected; associated reporting limit is estimated.

- Not applicable.

TABLE 1

**GROUNDWATER ANALYTICAL RESULTS  
NJGWQS COMPARISON  
JIS LANDFILL SITE**

Sample Location:	MW-45I	MW-45I	MW-45D	MW-45D	MW-46S	MW-46S	MW-46I	MW-46I	MW-46D	MW-46D	MW-47S	MW-47S	MW-47I	MW-47I	MW-47D	MW-47D	MW-48S		
Sample ID:	14737-100812-03	14737-040513-21	14737-100812-01	14737-040513-20	14737-100812-06	14737-040413-03	14737-100812-05	14737-040413-04	14737-100812-04	14737-040413-05	14737-100912-12	14737-100912-13	14737-041013-48	14737-041013-47	14737-100912-11	14737-041013-47	14737-100912-10	14737-041013-49	14737-100912-17
Sample Date:	10/8/2012	4/5/2013	10/8/2012	4/5/2013	10/8/2012	4/4/2013	10/8/2012	4/4/2013	10/8/2012	4/4/2013	10/9/2012	10/9/2012	Duplicate		4/10/2013	10/9/2012	4/10/2013	10/9/2012	
<b>Parameter</b>																			
<b>Volatiles</b>	<b>Units</b>																		
1,1,1-Trichloroethane	µg/L	1.0 U																	
1,1,2-Tetrachloroethane	µg/L	1.0 U																	
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U	0.55 J	1.0 U													
1,1-Dichloroethane	µg/L	1.0 U																	
1,1-Dichloroethene	µg/L	1.0 U																	
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.4	1.0 U															
1,2-Dichlorobenzene	µg/L	1.0 U																	
1,2-Dichloroethane	µg/L	1.0 U																	
1,2-Dichloropropane	µg/L	1.0 U																	
1,3-Dichlorobenzene	µg/L	1.0 U	0.16 J	1.0 U	1.0 U	0.15 J	1.0 U	1.0 U	1.0 U										
1,4-Dichlorobenzene	µg/L	1.0 U																	
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U																	
Acetone	µg/L	5.0 U																	
Benzene	µg/L	1.0 U																	
Bromodichloromethane	µg/L	1.0 U																	
Bromform	µg/L	1.0 U																	
Bromomethane (Methyl bromide)	µg/L	1.0 U																	
Carbon tetrachloride	µg/L	1.0 U																	
Chlorobenzene	µg/L	1.0 U																	
Chloroethane	µg/L	1.0 U																	
Chloroform (Trichloromethane)	µg/L	1.0 U																	
Chloromethane (Methyl chloride)	µg/L	1.0 U																	
cis-1,2-Dichloroethene	µg/L	1.0 U	8.4	20	12	20	1.0 U	1.0 U	1.0 U										
cis-1,3-Dichloropropene	µg/L	1.0 U	9.5	1.0 U															
Cyclohexane	µg/L	1.0 U																	
Dibromochloromethane	µg/L	1.0 U																	
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U																	
Ethylbenzene	µg/L	1.0 U																	
Hexane	µg/L	1.0 U																	
Methylene chloride	µg/L	1.0 U																	
Tetrachloroethene	µg/L	1.0 U	1.0 U	1.0 U	0.22 J	1.0 U	1.0 U												

TABLE 1

**ROUNDWATER ANALYTICAL RESULTS  
NJGWQS COMPARISON  
JIS LANDFILL SITE**

Notes

> - Greater than amount shown.

J - Estimated concentration.

R - Rejected.

U - Not detected at the associated reporting limit

UJ - Not detected; associated reporting limit is estimated.

- Not applicable.

- Not applicable

TABLE 1

## ROUNDWATER ANALYTICAL RESULTS NJGQCS COMPARISON JIS LANDFILL SITE

Sample Location:	MW-49D	MW-49D	MW-49D	MW-49D	MW-49D	MW-50S	MW-50S	MW-50S	MW-50S	MW-50S	MW-50I	MW-50I	MW-50I	MW-50I	MW-50D	MW-50D	
Sample ID:	14737-100912-09	14737-101713-02	14737-040813-34	14737-070913-10	14737-101513-12	14737-101212-44	14737-010713-08	14737-040813-30	14737-070913-16	14737-101613-17	14737-101212-45	14737-010713-09	14737-040813-29	14737-070913-15	14737-101613-19	14737-101212-46	
Sample Date:	10/9/2012	1/7/2013	4/8/2013	7/9/2013	10/15/2013	10/12/2012	1/7/2013	4/8/2013	7/10/2013	10/16/2013	10/16/2013	10/12/2012	1/7/2013	4/8/2013	7/10/2013	10/16/2013	10/12/2012
<b>Parameter</b>																<b>Units</b>	
<b>Volatiles</b>																	
1,1,1-Trichloroethane	µg/L	1.0 U															
1,1,2,2-Tetrachloroethane	µg/L	0.40 J	0.56 J	0.61 J	0.44 J	0.27 J	1.0 U										
1,1,2-Trichloroethane	µg/L	0.77 J	0.86 J	0.98 J	0.72 J	0.48 J	1.0 U										
1,1-Dichloroethane	µg/L	0.17 J	1.0 U	1.0 U	0.12 J	1.0 U	0.18 J	1.0 U	0.43 J	1.0 U	0.38 J	1.0 U					
1,1-Dichloroethene	µg/L	1.0 U	1.3														
1,2,4-Trichlorobenzene	µg/L	1.0 U	0.44 J	1.0 U	1.0 U	1.0 U											
1,2-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	0.31 J	1.0 U	1.0	2.0	1.4	1.2						
1,2-Dichloroethane	µg/L	0.89 J	1.1	1.1	0.83 J	1.0 U	0.43 J	1.0 U									
1,2-Dichloropropane	µg/L	1.0 U	1.0 U	0.52 J	0.40 J	1.0 U	0.32 J	1.0 U									
1,3-Dichlorobenzene	µg/L	1.0 U	4.0	9.5	7.7	7.9	4.6										
1,4-Dichlorobenzene	µg/L	1.0 U	19	48	30	29	7.2										
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U															
Acetone	µg/L	5.0 U															
Benzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	0.25 J	1.0 U										
Bromodichloromethane	µg/L	1.0 U															
Bromoform	µg/L	1.0 U															
Bromomethane (Methyl bromide)	µg/L	1.0 U															
Carbon tetrachloride	µg/L	1.0 U															
Chlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	0.18 J	1.0 U	24	40	44	33	18					
Chloroethane	µg/L	1.0 U	26	53	14	16	8.4										
Chloroform (Trichloromethane)	µg/L	0.74 J	0.82 J	0.71 J	0.45 J	1.0 U											
Chloromethane (Methyl chloride)	µg/L	1.0 U															
cis-1,2-Dichloroethene	µg/L	0.58 J	0.54 J	0.64 J	0.56 J	1.0 U	0.36 J	0.51 J	0.41 J	0.63 J	0.92 J						
cis-1,3-Dichloropropene	µg/L	1.0 U	1.6														
Cyclohexane	µg/L	1.0 U	0.94 J	1.6	0.61 J	1.0 U	1.7										
Dibromochloromethane	µg/L	1.0 U															
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U															
Ethylbenzene	µg/L	1.0 U	0.81 J	2.0	0.15 J	1.0 U	1.4										
Hexane	µg/L	1.0 U	0.76 J	1.0 U	1.0 U	1.0 U	1.0 U										
Methylene chloride	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	0.21 J	1.0 U	1.2	1.0 U	0.43 J	1.0 U						
Tetrachloroethene	µg/L	1.9	2.2	2.2	2.0	0.84 J	1.0 U										
Toluene	µg/L	1.0 U	0.50 J	1.6	0.48 J	0.32 J	0.30 J										
trans-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	0.18 J	1.0 U	0.36 J	0.98 J	0.45 J	0.32 J	1.0 U							
trans-1,3-Dichloropropene	µg/L	1.0 U															
Trichloroethene	µg/L	1.5	1.7	1.9	1.4	0.88 J	1.0 U	0.18 J	0.49 J								
Vinyl chloride	µg/L	1.0 U	0.29 J														
Xylenes (total)	µg/L	3.0 U	2.0 U	3.0 U	3.0 U	3.0 U	2.0 U	0.90 J	5.2	3.0 U	3.0 U	3.0 U					
Total VOCs	µg/L	6.95	7.78	8.84	7.13	2.47	0.92	ND	1.7	ND	ND	208.3	696.79	115	98.14	245.06	4.63
<b>Metals</b>																	
Arsenic	µg/L	7.2	3.8	2.2 J	4.5	2.1 J	2.5 U	4.2	6.9	4.6	4.8	5.6					
Manganese	µg/L	245	241	269	272	291	40.3	255	67.2	65.2	49.6	54.9	662	1480	904	355	
Potassium	µg/L	-	-	-	-	-	9620	-	9540	9220	-	-	12700	-	11500	8800	
<b>General Chemistry</b>																	
Ammonia	mg/L	-	-	-	-	0.044 J	-	0.10 U	0.10 U	-	-	1.5	-	1.2	2.4	0.79	
Chloride	mg/L	-	-	-	-	64.0	-	40.0	34.5	-	-	200	-	220	220	245	
Nitrate (as N)	mg/L	-	-	-	-	0.52 J	-	0.38	0.80	-	-	0.41 J	-	0.49	0.42	0.50 J	
Nitrite (as N)	mg/L	-	-	-	-	R	-	0.038 J	0.10 U	-	-	0.023 J	-	0.049 J	0.019 J	R	
Orthophosphate	mg/L	-	-	-	-	-	-	0.026 J	0.060	-	-	-	-	0.030 U	0.13	0.029 J	
Phosphate (ortho as PO4)	mg/L	-	-	-	-	0.021 J	-	-	-	-	-	0.079	-	-	-	0.21	
<b>Field Parameters</b>																	
Conductivity, field	µmhos/cm	297	22	309	366	359	879	729	953	955	999	999	1390	1640	1120	1090	
Dissolved oxygen (DO), field	mg/L	19.98	12.83	11.35	17.71	20 >	7.28	8.20	8.03	6.50	9.32	9.32	147	0.22	1.6	0.00	
Ferrous iron	mg/L	0.0	0.0	0	-	0.1	0.0	0	0	0.0	0.0	5.0	1.5	3.2	-	0.0	
Iron	mg/L	-	3.2	4	-	1.8	0.4	5.0	1	-	0.0	0.0	18.0	16.0	12	21.0	
Oxidation reduction potential (ORP), field	millivolts	297	342	320	248	234	117	167	148	95	166	166	-36	-26	-9	-105	
pH, field	s.u.	4.12	4.27	4.06	3.77	4.07	6.30	6.33	6.13	6.29	6.50	6.50	6.33	6.06	5.97	6.00	
Temperature, field	deg C	15.7	14.1	16.5	17.5	16.3	15.6	14.2	15.5	17.1	16.4	16.4	15.4	14.1	15.2	16.5	
Turbidity	NTU	730	497	187	590	130	19	96	100	220	27	24	26	406	51	44	

#### Notes:

> - Greater than amount shown.

J - Estimated concentration.

R - Rejected.

U - Not detected at the associated reporting limit.

UJ - Not detected; associated reporting limit is estimated.

- Not applicable.

## **BLE 1**

## UNDWATER ANALYTICAL RESULTS NJGWQS COMPARISON JIS LANDFILL SITE

#### Notes:

> - Greater than amount shown.

J - Estimated concentration.

R - Rejected.

U - Not detected at the associated reporting limit.

UJ - Not detected; associated reporting limit is estimated.

- Not applicable.

**TABLE 1**

**UNDWATER ANALYTICAL RESULTS  
NJWQS COMPARISON  
JIS LANDFILL SITE**

#### Notes:

> - Greater than amount shown.

J - Estimated concentration.

R - Rejected.

U - Not detected at the associated reporting limit.

UJ - Not detected; associated reporting limit is estimated.

- Not applicable.

• • • • •

TABLE 2

**SHALLOW GROUNDWATER ANALYTICAL RESULTS**  
**NJGWSL COMPARISON**  
**JIS LANDFILL**

Sample Location:		MP-6SR 14737-101212-40 10/12/2012	MP-6SR 14737-010713-06 1/7/2013	MP-6SR 14737-040813-26 4/8/2013	MP-6SR 14737-070913-19 7/10/2013	MP-6SR 14737-101513-11 10/15/2013	MW-5 14737-101112-27 10/11/2012	MW-5 14737-010713-04 1/7/2013	MW-5 14737-040813-35 4/8/2013	MW-5 14737-070913-08 7/9/2013	MW-5 14737-101413-01 10/14/2013	MW-6S 14737-041013-50 4/10/2013	MW-7S 14737-041013-53 4/10/2013	MW-7S 14737-041013-54 4/10/2013	MW-18S 14737-041013-52 4/10/2013		
Sample ID:	NJDEP Generic Vapor Intrusion Groundwater																
Sample Date:		10/12/2012	1/7/2013	4/8/2013	7/10/2013	10/15/2013	10/11/2012	1/7/2013	4/8/2013	7/9/2013	10/14/2013	4/10/2013	4/10/2013	4/10/2013	Duplicate		
Parameters	Units	Screening Levels															
<b>Volatiles</b>																	
1,1,1-Trichloroethane	µg/L	13000	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,1,2,2-Tetrachloroethane	µg/L	6	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,1,2-Trichloroethane	µg/L	8	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,1-Dichloroethane	µg/L	50	0.20 J	1.0 U	0.89 J	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	260	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,2,4-Trichlorobenzene	µg/L	130	1.0 U	0.34 J	1.0 U	200 U	25 U	50 U	0.50 J	0.82 J	500 U	50 U	1.0 U	11	9.5	1.0 U	
1,2-Dichlorobenzene	µg/L	6800	0.83 J	2.0	2.8	200 U	7.0 J	50 U	5.3	4.1	500 U	19 J	1.0 U	8.6	7.2	1.0 U	
1,2-Dichloroethane	µg/L	3	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	0.57 J	0.39 J	1.0 U		
1,2-Dichloropropane	µg/L	4	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.9	1.3	0.54 J		
1,3-Dichlorobenzene	µg/L	--	2.4	6.2	10	200 U	12 J	10 J	9.1	5.9	500 U	23 J	1.0 U	3.8	3.1	1.0 U	
1,4-Dichlorobenzene	µg/L	75	27	59	78	62 J	94	50	54	31	500 U	56	1.0 U	14	11	1.0 U	
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	900000	5.0 U	5.0 U	1000 U	130 U	250 U	5.0 U	5.0 U	2500 U	250 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Acetone	µg/L	2100000	5.0 U	5.0 U	1000 U	130 U	250 U	5.0 U	5.0 U	2500 U	250 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
Benzene	µg/L	20	27	1300	3500	3800	4900	6400	5000	2100	11000	16000	1.0 U	0.89 J	0.79 J	1.0 U	
Bromodichloromethane	µg/L	2	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Bromoform	µg/L	300	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Bromomethane (Methyl bromide)	µg/L	20	1.0 U	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	
Carbon tetrachloride	µg/L	1	1.0 U	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	
Chlorobenzene	µg/L	770	9.8	22	19	200 U	25	240	240	200	1000	800	1.0 U	8.7	7.1	1.0 U	
Chloroethane	µg/L	26000	6.1	10	13	200 U	25 U	26 J	13	5.4	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	
Chloroform (Trichloromethane)	µg/L	70	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Chloromethane (Methyl chloride)	µg/L	240	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
cis-1,2-Dichloroethene	µg/L	--	1.0 U	0.66 J	1.9	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	0.34 J	0.26 J	1.0 U	
cis-1,3-Dichloropropene	µg/L	7*	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Cyclohexane	µg/L	16000	2.1	6.4	7.7	200 U	16 J	42 J	53	25	500 U	140	1.0 U	0.35 J	0.25 J	1.0 U	
Dibromochloromethane	µg/L	6	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Dichlorodifluoromethane (CFC-12)	µg/L	1000	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Ethylbenzene	µg/L	700	1.0 U	14	54	200 U	94	80	26	29	410 J	120	1.0 U	0.11 J	0.10 J	1.0 U	
Hexane	µg/L	160	0.38 J	2.3	1.0 U	200 U	25 U	50 U	2.4	1.0	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	
Methylene chloride	µg/L	920	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	270 J	50 U	1.0 U	1.0 U	1.0 U	1.0 U		
Tetrachloroethene	µg/L	31	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U		
Toluene	µg/L	330000	0.56 J	3.3	4.4	200 U	4.6 J	50 U	8.0	14	500 U	50 U	1.0 U	0.15 J	1.0 U		
trans-1,2-Dichloroethene	µg/L	520	0.74 J	1.6	1.7	200 U	25 U	50 U	1.0	0.46 J	500 U	50 U	1.0 U	0.29 J	0.22 J	1.0 U	
trans-1,3-Dichloropropene	µg/L	7*	1.0 U	1.0 U	1.0 U	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	
Trichloroethene	µg/L	2	1.0 U	1.0 U	0.22 J	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	0.32 J	0.20 J	1.0 U	
Vinyl chloride	µg/L	1	1.0 U	1.0 U	1.0	200 U	25 U	50 U	1.0 U	1.0 U	500 U	50 U	1.0 U	1.0 U	1.0 U	1.0 U	
Xylenes (total)	µg/L	8600	0.37 J	48	240	380 J	1100	540	540	300	3300	1500	3.0 U	3.0 U	3.0 U	3.0 U	
Total VOCs	µg/L	--	77.48	1475.8	3934.61	4242</td											

TABLE 2

## **HALLOW GROUNDWATER ANALYTICAL RESULTS NJGWSL COMPARISON JIS LANDFILL**

Sample Location:	MW-42S	MW-42S	MW-43S	MW-43S	MW-43S	MW-43S	MW-43S	MW-44S	MW-44S	MW-44S							
Sample ID:	14737-101012-18	14737-040513-16	14737-101212-49	14737-010813-15	14737-040913-43	14737-070913-07	14737-101413-05	14737-101212-47	14737-101212-48	14737-010813-18	14737-040913-37	14737-070913-03	14737-070913-04	14737-101513-08	14737-100812-02		
Sample Date:	10/10/2012	4/5/2013	10/12/2012	1/8/2013	4/9/2013	7/9/2013	10/14/2013	10/12/2012	10/12/2012	1/8/2013	4/9/2013	7/9/2013	7/9/2013	10/15/2013	10/8/2012		
<b>Parameters</b>																	
<b>Units</b>																	
<b>Volatiles</b>																	
1,1,1-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U													
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	1.0 U	1.0 U													
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U													
1,1-Dichloroethane	µg/L	1.0 U	1.0 U	0.34 J	1.0 U	1.0 U	0.13 J	1.0 U	1.0 U	0.23 J							
1,1-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U													
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U													
1,2-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U													
1,2-Dichloroethane	µg/L	0.42 J	0.44 J	3.0	3.9	3.2		1.8	1.0 U	1.0 U	1.0 U						
1,2-Dichloropropane	µg/L	0.77 J	0.82 J	1.1	1.0 U	1.1	0.73 J	1.0 U	0.12 J	1.0 U							
1,3-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U													
1,4-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U													
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U													
Acetone	µg/L	5.0 U	5.0 U	5.0 U													
Benzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	0.14 J	0.14 J	1.0 U	2.5 J	0.085 J	0.75 J	0.37 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	µg/L	1.0 U	1.0 U	1.0 U													
Bromoform	µg/L	1.0 U	1.0 U	1.0 U													
Bromomethane (Methyl bromide)	µg/L	1.0 U	1.0 U	1.0 U													
Carbon tetrachloride	µg/L	1.0 U	1.0 U	1.0 U													
Chlorobenzene	µg/L	1.0 U	0.16 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U									
Chloroethane	µg/L	1.0 U	1.0 U	1.0 U													
Chloroform (Trichloromethane)	µg/L	1.0 U	1.0 U	1.0 U													
Chloromethane (Methyl chloride)	µg/L	1.0 U	1.0 U	1.0 U													
cis-1,2-Dichloroethene	µg/L	0.22 J	0.29 J	1.0 U	1.0 U	1.0 U											
cis-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U													
Cyclohexane	µg/L	1.0 U	1.0 U	1.0 U													
Dibromochloromethane	µg/L	1.0 U	1.0 U	1.0 U													
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U	1.0 U	1.0 U													
Ethylbenzene	µg/L	1.0 U	0.31 J	1.0 U	1.0 U												
Hexane	µg/L	1.0 U	1.0 U	1.0 U													
Methylene chloride	µg/L	1.0 U	1.0 U	1.0 U													
Tetrachloroethene	µg/L	1.0 U	1.0 U	1.0 U													
Toluene	µg/L	1.0 U	2.0	2.4	1.0 U	1.0 U											
trans-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	0.34 J	1.0 U	1.0 U	1.0 U										
trans-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U													
Trichloroethene	µg/L	1.0 U	1.0 U	1.0 U													
Vinyl chloride	µg/L	1.0 U	1.0 U	1.0 U													
Xylenes (total)	µg/L	3.0 U	2.0 U	3.0 U	3.0 U	0.51 J	3.0 U	1.5 J	1.6 J	2.0 U	3.0 U						
Total VOCs	µg/L	1.41	1.55	4.78	3.9	4.44	2.8	ND	2.5	0.085	1.42	0.37	3.5	4.43	ND	0.23	

## Notes:

J - Estimated concentration.

**U - Not detected at the associated reporting limit.**

### Criteria Notes:

\* - Criteria value for 1,3-Dichloropropene used.

-- Not applicable.

TABLE 2

**SHALLOW GROUNDWATER ANALYTICAL RESULTS**  
**NJGWSL COMPARISON**  
**JIS LANDFILL**

Sample Location:	MW-455	MW-465	MW-465	MW-475	MW-475	MW-475	MW-485	MW-485	MW-495	MW-495						
Sample ID:	14737-040513-22	14737-100812-06	14737-040413-03	14737-100912-12	14737-100912-13	14737-041013-48	14737-100912-17	14737-041013-44	14737-100912-07	14737-010713-01	14737-040813-32	14737-040813-33	14737-070913-12	14737-101513-09	14737-101212-44	
Sample Date:	4/5/2013	10/8/2012	4/4/2013	10/9/2012	10/9/2012	Duplicate	4/10/2013	10/9/2012	4/10/2013	10/9/2012	1/7/2013	4/8/2013	4/8/2013	7/9/2013	10/15/2013	10/12/2012
<b>Parameters</b>																
<b>Units</b>																
<b>Volatiles</b>																
1,1,1-Trichloroethane	µg/L	1.0 U	1.0 U													
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	0.21 J	1.0 U	1.0 U											
1,1,2-Trichloroethane	µg/L	1.0 U	0.25 J	1.0 U	1.0 U											
1,1-Dichloroethane	µg/L	0.25 J	1.0 U	0.18 J												
1,1-Dichloroethene	µg/L	1.0 U	1.0 U													
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.4	1.0 U	1.0 U	1.0 U	1.0 U	1.4	1.6	1.0 U	1.0 U	1.0 U				
1,2-Dichlorobenzene	µg/L	1.0 U	1.7	1.3	0.98 J	1.0	0.76 J	0.89 J	0.31 J							
1,2-Dichloroethane	µg/L	1.0 U	0.32 J	1.7	0.97 J	0.87 J	0.93 J	0.82 J	0.87 J	1.0 U						
1,2-Dichloropropane	µg/L	1.0 U	0.37 J	1.0 U	1.0 U											
1,3-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	0.16 J	1.0 U	1.0 U	1.0 U	1.5	0.87 J	0.66 J	0.65 J	0.50 J	0.54 J	1.0 U
1,4-Dichlorobenzene	µg/L	1.0 U	10	7.9	6.1	6.1	4.5	5.2	1.0 U							
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U													
Acetone	µg/L	5.0 U	5.0 U													
Benzene	µg/L	1.0 U	4.6	3.3	3.6	3.6	3.0	3.3								
Bromodichloromethane	µg/L	1.0 U	1.0 U													
Bromoform	µg/L	1.0 U	1.0 U													
Bromomethane (Methyl bromide)	µg/L	1.0 U	1.0 U													
Carbon tetrachloride	µg/L	1.0 U	1.0 U													
Chlorobenzene	µg/L	1.0 U	1.5	1.1	0.98 J	1.1	0.94 J	0.98 J	0.18 J							
Chloroethane	µg/L	1.0 U	1.0 U													
Chloroform (Trichloromethane)	µg/L	1.0 U	1.0 U													
Chloromethane (Methyl chloride)	µg/L	1.0 U	1.0 U													
cis-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	8.4	9.5	20	1.0 U	1.0 U	0.97 J	0.81 J	1.0	1.0	0.81 J	0.74 J	1.0 U	
cis-1,3-Dichloropropene	µg/L	1.0 U	1.0 U													
Cyclohexane	µg/L	1.0 U	2.1	0.67 J	1.3	1.5	1.3	1.6	1.0 U							
Dibromochloromethane	µg/L	1.0 U	1.0 U													
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U	1.0 U													
Ethylbenzene	µg/L	1.0 U	1.0 U													
Hexane	µg/L	1.0 U	1.0 U													
Methylene chloride	µg/L	1.0 U	1.0 U													
Tetrachloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.4	1.5	1.0 U	1.0 U							
Toluene	µg/L	1.0 U	0.20 J	1.0 U	0.16 J	0.17 J	0.16 J	1.0 U	1.0 U							
trans-1,2-Dichloroethene	µg/L	1.0 U	0.74 J	0.40 J	0.55 J	0.59 J	0.52 J	1.0 U	1.0 U	1.0 U						
trans-1,3-Dichloropropene	µg/L	1.0 U	1.0 U													
Trichloroethene	µg/L	1.0 U	0.54 J	1.0 U	1.5	1.6</td										

TABLE 2

**SHALLOW GROUNDWATER ANALYTICAL RESULTS**  
**NJGWSL COMPARISON**  
**JIS LANDFILL**

Sample Location:	MW-50S	MW-50S	MW-50S	MW-50S	MW-50S	MW-51S	MW-51S	MW-52S	MW-52S	MW-54S	MW-54S	MW-55S	MW-55S	MW-66S	MW-67S
Sample ID:	14737-010713-08	14737-040813-30	14737-070913-16	14737-101613-17	14737-101613-18	14737-101112-32	14737-040413-07	14737-101112-31	14737-040513-15	14737-100912-16	14737-040413-02	14737-101012-23	14737-040513-12	14737-041113-62	14737-041113-61
Sample Date:	1/7/2013	4/8/2013	7/10/2013	10/16/2013	10/16/2013	10/11/2012	4/4/2013	10/11/2012	4/5/2013	10/9/2012	4/4/2013	10/10/2012	4/5/2013	4/11/2013	4/11/2013
<b>Parameters</b>															<b>Units</b>
<b>Volatiles</b>															
1,1,1-Trichloroethane	µg/L	1.0 U													
1,1,2,2-Tetrachloroethane	µg/L	1.0 U													
1,1,2-Trichloroethane	µg/L	1.0 U													
1,1-Dichloroethane	µg/L	1.0 U	0.30 J	1.0 U											
1,1-Dichloroethene	µg/L	1.0 U													
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.7	1.0 U	1.4	1.0 U									
1,2-Dichlorobenzene	µg/L	1.0 U													
1,2-Dichloroethane	µg/L	1.0 U													
1,2-Dichloropropane	µg/L	1.0 U													
1,3-Dichlorobenzene	µg/L	1.0 U	0.16 J	1.0 U											
1,4-Dichlorobenzene	µg/L	1.0 U	0.29 J												
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U													
Acetone	µg/L	5.0 U													
Benzene	µg/L	1.0 U													
Bromodichloromethane	µg/L	1.0 U													
Bromoform	µg/L	1.0 U													
Bromomethane (Methyl bromide)	µg/L	1.0 U													
Carbon tetrachloride	µg/L	1.0 U													
Chlorobenzene	µg/L	1.0 U													
Chloroethane	µg/L	1.0 U													
Chloroform (Trichloromethane)	µg/L	1.0 U	0.26 J												
Chloromethane (Methyl chloride)	µg/L	1.0 U													
cis-1,2-Dichloroethene	µg/L	1.0 U	0.46 J	0.45 J	1.0 U	1.0 U	3.7	10	0.77 J						
cis-1,3-Dichloropropene	µg/L	1.0 U	1.1												
Cyclohexane	µg/L	1.0 U													
Dibromochloromethane	µg/L	1.0 U													
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U													
Ethylbenzene	µg/L	1.0 U													
Hexane	µg/L	1.0 U													
Methylene chloride	µg/L	1.0 U													
Tetrachloroethene	µg/L	1.0 U	3.7	3.7	0.69 J										
Toluene	µg/L	1.0 U													
trans-1,2-Dichloroethene	µg/L	1.0 U													
trans-1,3-Dichloropropene	µg/L	1.0 U													
Trichloroethene	µg/L	1.0 U	0.34 J	0.10 J	0.23 J	0.22 J	1.0 U	1.0 U	1.0 U	1.9	3.7				
Vinyl chloride	µg/L	1.0 U	0.68 J	1.0 U											
Xylenes (total)	µg/L	3.0 U	3.0 U	3.0 U	2.0 U	2.0 U	3.0 U								
Total VOCs	µg/L	ND	1.7	ND	ND	0.64	0.1	0.85	0.89	ND	ND	9	18.8	2.4	

TABLE 3

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**VADOSE ZONE FIELD SAMPLING RESULTS**  
**JIS LANDFILL SITE**

Well	12-Dec-12					30-Apr-13					21-Oct-13				
	PID in Well (ppm)	PID @ Ground Level	O2 (%)	CO2 (%)	CH4 (%)	PID in Well (ppm)	PID @ Ground Level	O2 (%)	CO2 (%)	CH4 (%)	PID in Well (ppm)	PID @ Ground Level	O2 (%)	CO2 (%)	CH4 (%)
MW55V	0.00	0.00	17.10	4.20	0.00	0.00	0.00	18.40	3.20	0.00	0.00	0.00	18.70	3.00	0.00
MW42V	0.00	0.00	18.60	0.70	0.00	0.00	0.00	19.60	0.40	0.00	0.00	0.00	19.30	0.70	0.00
MW43V	0.10	0.00	17.90	0.80	0.00	0.10	0.00	19.90	0.50	0.00	0.10	0.00	19.30	0.80	0.00
MW44V	0.00	0.00	14.20	7.40	0.00	0.00	0.00	16.60	4.40	0.00	0.00	0.00	16.20	5.30	0.00
MW45V	0.00	0.00	17.40	3.90	0.00	0.00	0.00	19.40	2.60	0.00	0.00	0.00	18.90	2.70	0.00
MW46V	0.00	0.00	19.10	2.30	0.00	0.00	0.00	20.10	1.60	0.00	0.00	0.00	19.60	1.00	0.00
MW49V	0.00	0.00	18.70	0.40	0.00	0.00	0.00	19.40	0.30	0.00	0.00	0.00	19.30	0.40	0.00
MW50V	0.00	0.00	17.10	4.80	0.00	0.00	0.00	16.40	4.60	0.00	0.00	0.00	16.80	5.30	0.00
MW65V	0.00	0.00	19.40	2.40	0.00	0.00	0.00	20.50	2.30	0.00	0.00	0.00	19.50	1.70	0.00
MW66V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00	20.10	0.00	0.00
MW67V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.00	4.00	0.00	0.00	0.00	18.30	3.80	0.00